SURVEY OF PASSAMAQUODDY TIDAL POWER PROJECT

HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE COMMITTEE ON FOREIGN AFFAIRS HOUSE OF REPRESENTATIVES

EIGHTY-THIRD CONGRESS

FIRST SESSION

ON

H. J. Res. 112, H. J. Res. 113, and H. J. Res. 114

TO AUTHORIZE AND DIRECT THE INTERNATIONAL JOINT COMMISSION ON UNITED STATES-CANADIAN BOUNDARY WATERS TO MAKE A SURVEY OF THE PROPOSED PASSAMAQUODDY TIDAL POWER PROJECT AND FOR OTHER PURPOSES

JULY 14 AND 22, 1953

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To authorize and direct the International Joint Commission on United States-Canadian Boundary Waters to make a survey of the proposed Passamaquoddy tidal power project, and for other purposes

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SURVEY OF PASSAMAQUODDY TIDAL POWER PROJECT

TUESDAY, JULY 14, 1953

HOUSE OF REPRESENTATIVES,
COMMITTEE ON FOREIGN AFFAIRS,
SUBCOMMITTEE ON HOUSE JOINT RESOLUTIONS 112, 113, AND 114,
Washington, D. C.

The subcommittee convened pursuant to call at 9:35 a. m., room G–3, United States Capitol, Hon. Chester E. Merrow (chairman of the subcommittee) presiding.

Mr. MERROW. The subcommittee will come to order.

We have a majority of our Subcommittee of the Foreign Affairs Committee on International Movements and Organizations present.

For the benefit of the witnesses this morning and others present, this committee includes Mrs. Bolton, Mr. LeCompte, Mr. Battle, and Mr. Hays.

This committee on international movements and organizations is acting this morning as an ad hoc subcommittee for the purpose of having a public hearing on three identical measures which have been introduced in the House, House Joint Resolution 112, by Hon. Clifford G. McIntire, of Maine; House Joint Resolution 113, by Hon. Charles P. Nelson, of Maine; and House Joint Resolution 114, by Hon. Robert Hale, of Maine.

These measures are for the purpose of authorizing and directing the International Joint Commission on United States-Canadian Boundary Waters to make a survey of the proposed Passamaquoddy tidal power project and for other purposes.

Identical measures have been introduced in the other body by Senators Smith and Payne.

(The bills referred to follow:)

[H. J. Res. 112, 83d Cong., 1st sess.]

JOINT RESOLUTION To authorize and direct the International Joint Commission on United States-Canadian boundary waters to make a survey of the proposed Passamaquoddy tidal power project, and for other purposes

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the International Joint Commission created by the treaty between the United States and Great Britain relating to boundary waters between the United States and Canada, signed at Washington on January 11, 1909, under the provisions of such treaty, is authorized and directed to make a survey to determine the cost of construction of the proposed Passamaquoddy tidal power project at Passamaquoddy Bay in the State of Maine, United States of America, and the Province of New Brunswick, Dominion of Canada, and to determine whether or not such cost would allow hydroelectric power to be produced at a price that is economically feasible, and also to determine what contribution such project would make to the national economy and the national defense.

SEC. 2. The survey provided for in the first section shall be consistent with the report (dated March 15, 1950) made by the International Passamaquoddy Engineering Board to the International Joint Commission, and with the supplemental report (dated May 1952) on details of estimate of cost of comprehensive investigation of Passamaquoddy tidal power project by Corps of Engineers, United States Army.

SEC. 3. The Secretary of the Army, the Federal Power Commission, and other officers and agencies of the Government of the United States are authorized to assist the International Joint Commission in the making of such survey, and shall be compensated for any work performed pursuant to this section out of such funds as may hereafter be appropriated for use by the International Joint Commission in carrying out this joint resolution.

SEC. 4. The International Joint Commission shall report the results of such survey to the Congress of the United States and to the Government of the Dominion of Canada.

SEC. 5. There is authorized to be appropriated not to exceed $3 million to carry out this joint resolution, and any sum appropriated pursuant to this section shall be included in any determination of the proportionate share of the cost of construction of the Passamaquoddy tidal power project to be borne by the United States.

[H. J. Res. 113, 83d Cong., 1st sess.]

JOINT RESOLUTION To authorize and direct the International Joint Commission on United States-Canadian boundary waters to make a survey of the proposed Passamaquoddy tidal power project, and for other purposes

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the International Joint Commission created by the treaty between the United States and Great Britain relating to boundary waters between the United States and Canada, signed at Washington on January 11, 1909, under the provisions of such treaty, is authorized and directed to make a survey to determine the cost of construction of the proposed Passamaquoddy tidal power project at Passamaquoddy Bay in the State of Maine, United States of America, and the Province of New Brunswick, Dominion of Canada, and to determine whether or not such cost would allow hydroelectric power to be produced at a price that is economically feasible, and also to determine what contribution such project would make to the national economy and the national defense.

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SEC. 3. The Secretary of the Army, the Federal Power Commission, and other officers and agencies of the Government of the United States are authorized to assist the International Joint Commission in the making of such survey, and shall be compensated for any work performed pursuant to this section out of such funds as may hereafter be appropriated for use by the International Joint Commission in carrying out this joint resolution.

SEC. 4. The International Joint Commission shall report the results of such survey to the Congress of the United States and to the Government of the Dominion of Canada.

SEC. 5. There is authorized to be appropriated not to exceed $3,000,000 to carry out this joint resolution, and any sum appropriated pursuant to this section shall be included in any determination of the proportionate share of the cost of construction of the Passamaquoddy tidal power project to be borne by the United States.

[H. J. Res. 114, 83d Cong., 1st sess.]

JOINT RESOLUTION To authorize and direct the International Joint Commission on United States-Canadian boundary waters to make a survey of the proposed Passamaquoddy tidal power project, and for other purposes

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the International Joint Commission created by the treaty between the United States and Great Britain relating to boundary waters between the United States and Canada, signed at Washington

on January 11, 1909, under the provisions of such treaty, is authorized and directed to make a survey to determine the cost of construction of the proposed Passamaquoddy tidal power project at Passamaquoddy Bay in the State of Maine, United States of America, and the Province of New Brunswick, Dominion of Canada, and to determine whether or not such cost would allow hydroelectric power to be produced at a price that is economically feasible, and also to determine what contribution such project would make to the national economy and the national defense.

SEC. 2. The survey provided for in the first session shall be consistent with the report (dated March 15, 1950) made by the International Joint Commission and with the supplemental report (dated May 1952) on details of estimate of of cost of comprehensive investigation of Passamaquoddy tidal power project by Corps of Engineers, United States Army.

SEC. 3. The Secretary of the Army, the Federal Power Commission, and other officers and agencies of the Government of the United States are authorized to assist the International Joint Commission in the making of such survey, and shall be compensated for any work performed pursuant to this section out of such funds as may hereafter be appropriated for use by the International Joint Commission in carrying out this joint resolution.

SEC. 4. The International Joint Commission shall report the results of such survey to the Congress of the United States and to the Government of the Dominion of Canada.

SEC. 5. There is authorized to be appropriated not to exceed $3,000,000 to carry out this joint resolution, and any sum appropriated pursuant to this section shall be included in any determination of the proportionate share of the cost of construction of the Passamaquoddy tidal power project to be borne by the United States.

Mr. MERROW. We have with us this morning the entire Maine delegation in the House, Mr. McIntire, Mr. Nelson, and Mr. Hale, and the Senators from Maine, Hon. Margaret Chase Smith and Hon. Frederick G. Payne.

Mr. McIntire has arranged for the presentation of the witnesses in support of this legislation and has been working with the committee on this meeting.

Since he has made all arrangements with respect to time and as to the order of witnesses, I am going to call on our colleague, Mr. McIntire first. He may proceed in his own way and present his witnesses as he wishes.

I might say, Mr. McIntire, that we have other members, Messrs. Carnahan and Bentley of the full committee present with us this morning and we may have others as we proceed.

You may go ahead.

STATEMENT OF HON. CLIFFORD G. McINTIRE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MAINE

Mr. MCINTIRE. Thank you, Mr. Chairman.

First, may I express on behalf of our Maine delegation, our sincere appreciation to the chairman of the Foreign Affairs Committee, and to you, as chairman of this subcommittee, the members of your subcommittee and the members of the Foreign Affairs Committee, for their interest in the legislation which our colleagues and I have presented to the House and to the other body.

It was my thought that the committee members would get the overall picture of the matter which we wish to present to you in a little better light if we divided it into three general areas of discussion and testimony.

I would like to make the suggestion that we present the testimony of the members of the delegation and then move over to questioning.

I make that suggestion because I have arranged the presentation in three general parts:

(1) A historical background of the Passamaquoddy project which will be presented by the senior Senator from Maine, Mrs. Smith.

(2) A review of, you might say, the economic aspects of the Passamaquoddy project, something of its potential, it is important to maintain the Northeast region, that to be presented by the junior Senator from Maine, Mr. Payne.

I will present to the committee, some of the geographic aspects, a little of the principal involved in the project. Then Mr. Nelson and Mr. Hale will present their thoughts to the committee relative to this project.

May I present to the committee the senior Senator from Maine, Hon. Margaret Chase Smith.

Mr. MERROW. Senator Smith, will you come down here, please?

STATEMENT OF HON. MARGARET CHASE SMITH, A UNITED STATES SENATOR FROM THE STATE OF MAINE

Senator SMITH. Mr. Chairman and members of the subcommittee, the Maine congressional delegation is most appreciative of your courtesy in permitting it to appear before you on the proposed Passamaquoddy tidal power project. We are gratified that steady efforts of Representative McIntire have resulted in this hearing.

My function at this hearing is to give you the highlights of the history of the proposed project. And it will be highlights as I do not wish to burden you with details.

One of the principal points that I want to make in this brief historical sketch of the proposed Passamaquoddy tidal power project, which I shall hereafter refer to as Quoddy for the sake of brevity, is that the current proposal is in no way to be mistaken for, or mentally associated with, the All-American project of the early thirties and the related activities which have caused some to view Quoddy as an experiment in socialism. The currently proposed project is entirely different. It is international in scope. It has not the slightest implication of socialism. Its only major purpose is to produce electric power.

Quoddy, in its original conception was international in scope. The original plan contemplated the use of that part of Passamaquoddy Bay on the Canadian side of the international boundary as a high-level pool, and the use of Cobscook Bay, an arm of Passamaquoddy Bay lying wholly within the United States, as a low-level pool.

The Quoddy proposal started as far back as 1919 when an eminent American engineer, Dexter P. Cooper, put forward a plan for harnessing the power inherent in the large tides of the Passamaquoddy area by building dams and sluiceways in the openings into the Bay of Fundy and powerhouses in openings between Passamaquoddy Bay and Cobscook Bay.

Passamaquoddy Bay was to be filled at high tide and held as a high-level pool and Cobscook Bay was to be emptied at low tide and maintained as a low pool. Water passing from the high to the low pool was to be passed through the power plant at varying heads as the water fell in the upper and rose in the lower pool in the interval between the filling and draining periods.

In 1921 Franklin D. Roosevelt is said to have discussed the possibilities of harnessing tidal power in the Passamaquoddy region with Owen D. Young of the General Electric Co. This company made a preliminary rough survey of the area with the result finding that it was "of interest and well worth studying, but that demand for power at that time did not justify anything further."

On January 2, 1924, Dexter P. Cooper, a citizen of Maine, filed with the Federal Power Commission an application for a preliminary permit for this international project. Westinghouse Electric, General Electric, and utility companies joined Mr. Cooper in carrying on the engineering investigations.

On December 3, 1925, he filed another application under the incorporated name of Dexter P. Cooper, Inc., the State Legislature of Maine having passed an act incorporating the Dexter P. Cooper, Inc., later approved in a referendum. On May 28, 1926, the Commission issued a preliminary permit to the Cooper Corp. On October 22, 1928, the permittee filed an application for a license.

Then the scope of Quoddy changed from international to All-American as on September 16, 1929, the Cooper corporation filed a revised application for a two-pool tidal power project lying wholly within the United States, those parts of the more comprehensive project within Canadian territory being eliminated. This change came when Canada took adverse action fearing the proposed dams would harm the fisheries.

At the direction of the President, the Army engineers made a study of the project in 1933 and found it to be feasible from an engineering standpoint. On September 19, 1933, the Cooper corporation amended its application for a license, making it identical with a project application which the Cooper corporation had filed on September 11, 1933, with the Federal Emergency Administration of Public Works for a loan of $43 million with which to construct the project.

In response to a request of the Federal Emergency Administration, a report was made on January 3, 1934, by the Federal Power Commission. It was adverse and so the application for the loan was disapproved by the Federal Emergency Administration.

Then on November 14, 1934, the Administrator of Public Works appointed a special commission—the Passamaquoddy Bay Tidal Power Commission—to study Quoddy.

Two months later, on January 17, 1935, this Commission made a favorable report recommending $30 million for Quoddy on the All-American basis, with the ultimate goal of international scope being recommended. In December 1935, the Army engineers estimated that the All-American project would cost $61,500,000. A review by an Interior Department board upped that estimate to $68,158,000.

On May 28, 1935, under the provisions of the Federal Emergency Relief Appropriation Act of 1935, an allotment of $10 million was made to the War Department for commencing construction of Quoddy. This amount was subsequently reduced to $7 million. As additional funds for the continuation of operation were not appropriated by Congress, operations were suspended shortly after the close of fiscal year 1936. Demobilization of plant and personnel was completed by June 30, 1937.

On February 2, 1939, the Senate adopted Senate Resolution 62, introduced by Senator Vandenberg, requesting the Federal Power Com-

mission to review its reports on Quoddy and to bring them up to date. Pursuant to that resolution, on April 3, 1941, the Federal Power Commission filed a report on Quoddy with the Senate. That report was adverse.

But again let me point out that this was on the All-American project and not on a project of international scope.

Lest these adverse reports on the All-American project mislead you, let me quote from page 37, the Federal Power Commission 1941 report, in which the Commission states:

> * * * As high-grade fuel prices increase concurrently with expanding power markets in the Northeastern States and contiguous Canadian territory, the development of tidal power will at some time in the future, become economically feasible and desirable.
>
> The fact that the development and utilization of tidal power is contraindicated at this time should not preclude thorough exploration of the possibilities of a large international tidal power project at Passamaquoddy by the Governments of the United States and Canada.

Disaster in Maine in 1947 lay the foundation for a revival of Quoddy. In that year Maine was struck not only with tragic forest fires but drought as well. Our rivers ran low and we had a critical power shortage. The shortage was so great that naval vessels had to be sent in to pump power into the Maine towns from the powerplants of the vessels.

On March 11, 1948, I introduced H. R. 5821, to establish the Passamaquoddy power project on an international basis for the development and use of tidal energy in the waters of Passamaquoddy Bay for the production of electrical power and proposing an authorization of $100 million. On April 9, 1948, the Chairman of the American Section of the International Joint Commission expressed the opinion that action on the matter should go through the International Joint Commission since it had jurisdiction over such an international matter.

The Maine congressional delegation then urged the President to request the State Department to make application to the International Joint Commission.

On January 5, 1949, I again introduced my $100 million authorization bill—this time in the Senate. However, the Maine congressional delegation later concluded that since the proposed project was international in scope that preliminary study should be made through the regular channels of the State Department and the International Joint Commission.

A hearing was held on January 24, 1949, by the International Joint Commission. That hearing led to the conclusion of the Commission and the Army engineers that a preliminary survey should be made to determine the physical feasibility of Quoddy and the cost of an overall survey that would determine the economic feasibility and the cost of the project itself.

Subsequently it was found that such a preliminary survey would cost $60,000. It was decided that the cost would be split evenly between the two countries. In relatively short time Canada put up her $30,000 and in June 1949, Congress appropriated $30,000 for the United States share of the cost of the preliminary survey.

On August 19–22, 1949, the International Joint Commission held public hearings in St. Andrews, New Brunswick, and Eastport, Maine. These hearings and the investigation and study of the Army

engineers led to a report in March 1950 by the Army engineers to the International Joint Commission.

In that report the Army engineers made a finding that the overall survey would cost $3,900,000 and would take 3 years—$300,000 of this being for a study of the effect the construction of dams would have on the fish in the area.

In January 1951 the Maine congressional delegation introduced joint resolutions in the House and Senate to authorize $3,900,000 for the proposed survey. In June 1952 the Army engineers scaled their estimate of the cost down $900,000 less to $3 million.

This reduction in the estimate was made possible by the use of recently developed electronic depth finder "sonar" equipment which it is claimed will materially reduce the cost of foundation explorations and thereby the cost of the entire investigation.

On November 19, 1952, I asked the Secretary of State, for the status of negotiations with Canada on the proposed overall $3 million survey. On December 3, 1952, the State Department in reply to my inquiry informed me that Canada would grant permission for the survey to be made but would not share in the cost of the survey.

At the beginning of this Congress in January this year, the Maine congressional delegation introduced joint resolutions in the House and Senate proposing a $3 million overall survey.

On February 10, 1953, the Maine congressional delegation called on President Eisenhower and urged his support of the proposed survey. On March 31, 1953, the State Department forwarded a copy of the official note of the Government of Canada dated March 11, 1953, stating that Canada did not consider the proposed Quoddy to be practical and that "it would not seem to be advantageous to initiate further surveys" but that if the United States had "new information regarding the tidal power schemes" Canada would welcome such information and would consider the matter.

In attempts to obtain such "new information" as would reopen Canadian interest, I talked and corresponded with several persons interested in Quoddy. Out of these efforts came an informal bid of Thomas Worcester, Inc., reputable engineers of Boston, on May 12, 1953, to make the survey for $1,500,000. The Chief of the Army engineers recently informed me that he welcomed the bid of the Thomas Worcester, Inc. engineering firm but that the Army engineers could not cut its own estimate below the $3 million figure.

Such is the history of Quoddy up to the arrangements that Representative McIntire made for this hearing this morning.

Mr. Chairman, a telegram came to me from the Governor of Maine, Hon. Burton Cross, dated July 13:

Hon. MARGARET CHASE SMITH:

I realize you go before the subcommittee today requesting $3 million for final survey of Quoddy. Will you convey to the committee my wholehearted endorsement of this appropriation. I believe we owe it to the Maine citizens to resolve this project one way or the other. It has a tremendous potential value to national defense in this area.

BURTON M. CROSS,
Governor of Maine.

Thank you very much.

Mr. MERROW. Senator Smith, you have made a very comprehensive statement setting forth in a clear way the history of the Passamaquoddy project.

As you came to the end of the statement, you stated that Canada was not interested because she did not consider it practical.

Do you think that Canada may be interested in this as it moves on, if it does move on?

Senator SMITH. All of the reports coming to us indicate that Canada is interested. They have always been a little worried about the fisheries but with this suggestion of the complete survey of the fisheries, I personally think that they will be interested if we show enough interest in it.

Mr. MERROW. Their main fear is fisheries, then? I wondered about that.

Senator SMITH. That has been indicated by all of the reports that we have had.

Mr. MERROW. As you pointed out the estimate of an overall survey has come from $3.9 million down to $3 million, which is the amount asked for in this bill and then there is a group of engineers who say they could do it for $1.5 million.

Now, if you want to comment a little more on that, from your study of it, do you think it could be done for less than $3 million, or should we give the $3 million and let the Appropriations Committee decide?

Senator SMITH. I think if we could get the authorization, although I would hope that before you report on the proposal, you would call the Chief of the Army Engineers and the Thomas Worcester, Inc., firm I mentioned, have them come before the committee and have them give their estimates.

I am not an engineer and could not attempt to guess at it.

I have been of the opinion that it would be a figure between $1.5 million and $3 million, after talking with both groups.

Our purpose, I think, is to have a thorough survey. We do not want anything unless it is complete enough to give us the final answer on whether or not we should go forward with the construction of such a project.

Mr. MERROW. Now we have four members of our subcommittee here this morning.

Mrs. Bolton——

Mrs. BOLTON. May I welcome Mrs. Smith back in the proper House. We are very proud of you as head of the Maine delegation, Mrs. Smith and I am very proud of the work you are doing in the Senate.

The Passamaquoddy problem has troubled some of us through the years when it was not this kind of a problem, or process of development. I am deeply grateful to you for clarifying my own thinking on the matter. You have made it sound like an exceedingly important development. My own sense of all these matters is that the more we can work internationally, particularly with Canada to bind her to us and us to her, the more we build a secure friendly and happy future for the Northern Hemisphere.

We will go into the figures a little bit more as the hearings progress as we are anxious to authorize only something which will really do the job indicated.

I think I have no questions at all except to express my hope that we shall have you before us many times. It has been a great pleasure.

Senator SMITH. Thank you very much. You are very generous, as always. My memories of association in the House with you are most

pleasant. I appreciate your interest and I am gratified to know that I have helped to clear up the matter.

Mr. MERROW. I believe your statement is a tremendous contribution to this. It has clarified a lot of things in my own mind.

Mr. Battle——

Mr. BATTLE. Thank you, Mr. Chairman.

I would like to join my colleagues in welcoming the Maine delegation and especially Senator Smith and Senator Payne.

I have two or three short questions on subjects that I think are pretty clear, but I would like to make them definite:

Mrs. Smith, do I understand that this would necessarily be a joint project with Canada, or is it something that is possible for us to carry on alone?

Senator SMITH. I do not want to infringe on the other members of the delegation because they will probably be ready to answer some of these questions.

No; we have to have their consent of course. It is a joint project. If we could agree as to the procedure, we could continue on our own. We have to have the authorization from both countries. It is an international project and it could well be called the Bay of Fundy project as it has been termed sometimes.

We could make the survey ourselves, but the construction of the project would have to be joint.

Mr. BATTLE. It this proposal that we make the survey alone?

Senator SMITH. Yes; we could make the survey alone.

Mr. BATTLE. As I understand it, this money is only for a survey and not for construction purposes?

Senator SMITH. This is for a complete survey.

Part of it has been made, of course. Some of the work in the survey has been conducted but this would be a completion of the soundings and all of the engineering study that would have to be done.

Mr. BATTLE. This would only cover this particular project and not other boundary waters between Canada and the United States?

Senator SMITH. This is only for Passamaquoddy.

Mr. BATTLE. Thank you.

Mr. MERROW. Mr. LeCompte——

Mr. LECOMPTE. Thank you, Senator Smith. You have my admiration for your splendid statement and, of course, of your distinguished service in the Senate and I recall with a great deal of pleasure the time you spent with us in the House.

You have told me more than I ever knew about Passamaquoddy.

There was a considerable amount of money spent in the thirties. Was that on construction or was that surveys?

Senator SMITH. That was on construction. I think you will get that when Congressman McIntire gives you the presentation of the physical aspects of the proposed project.

Mr. LECOMPTE. That is all lost.

Senator SMITH. No; that will be used to a certain extent.

Of course, that part of the work will lighten the burden of this survey, and if the survey were such that construction would be advised it would be a part of the overall project.

Mr. LECOMPTE. Now one more question, if I may:

Does this bill contemplate a survey by the Army engineers? It sets up a Commission to make the survey, does it not?

Senator SMITH. That would be decided by the Commission.

Mr. LECOMPTE. Who would make the survey, here?

Senator SMITH. The Army engineers would make the survey.

Mr. LECOMPTE. We do have a considerable appropriation each year in the civil-functions bill for surveys but possibly not enough to take care of this survey.

Senator SMITH. Yes, and also some thought has been given to the President taking some of his contingent fund for such a survey, but the delegation has felt that unless the Congress wanted it carried out it would be better to have it done with authorization of Congress rather than trying to put it through in any other guise.

Mr. LECOMPTE. Have there been any hearings in the Senate that would be helpful to this committee?

Senator SMITH. There have not been any recent hearings. There is one about to be set up. We hope to take what you develop here and profit by it over there.

Mr. LECOMPTE. Thank you very much, Mrs. Smith.

Mr. MERROW. We have two members of the full committee besides our subcommittee here, Mr. Carnahan and Mr. Prouty.

Mr. Carnahan, would you like to ask some questions about this?

Mr. CARNAHAN. Mr. Chairman, I will not take the time of the committee to ask any questions.

I would like to say it is a pleasure to be here this morning and to hear Senator Smith's fine presentation and we are happy to welcome her back to this side again.

Senator SMITH. Thank you very much.

Mr. MERROW. Mr. Prouty——

Mr. PROUTY. I have no questions, Mr. Chairman. I am sorry I missed Senator Smith's presentation. I know it must have been very worthwhile. I am very much interested in this project and I am proud of my colleagues in the Maine delegation for the work they have done in bringing congressional attention to this proposal.

Senator SMITH. Mr. Chairman, I would like to be sure that I cleared up my answer to Congressman Battle on the cost of the survey going into the construction.

My assistant called my attention to the fact that such things as borings and some of the construction would be used later on, and that would come out of this amount and that the survey would be made under the direction of the International Joint Commission, under the Army engineers.

Mr. MERROW. Senator Smith, we have been happy to have you with us this morning. You said you had to leave for a committee of your own. I am sorry you cannot stay with us.

Senator SMITH. Thank you, very much, Mr. Chairman. I have to go back and talk about the MSA appropriations after a while but I will stay for a while, if I may.

Mr. MERROW. Mr. McIntire——

Mr. MCINTIRE. May I present to you the junior Senator from Maine, the Honorable Frederick G. Payne, who will give you some of the aspects of this project in relation to the economy of Maine.

I am sure you are all acquainted with the fact that Senator Payne served as our Governor for 4 years and came from the termination

of his term as governor into the Senate and has been very actively interested in the overall aspects of this project and its importance to the Northeast.

Senator Payne.

STATEMENT OF HON. FREDERICK G. PAYNE, A UNITED STATES SENATOR FROM THE STATE OF MAINE

Senator PAYNE. Mr. Chairman and members of the committee, may I add my appreciation to those of my colleagues for permitting us to come before you and speak on this so-called Quoddy project.

I will try to make my remarks as brief as possible, in connection with the economy of the region and what this development would result in if full accomplishment is attained.

I know you are interested in whether or not it will result in developing a strengthened economy and also result in bringing to the benefit of people not only of Maine but of the entire Northeast region benefits that are not available at the present time.

Before I touch upon the several developments that might result if this power were available, may I first call to your attention the fact that, as Senator Smith has so well pointed out, we are a long distance away from fuel sources. We have to depend upon both coal and oil from other regions of the country. The increasing cost is, of course, adding to the result and cost of producing electrical energy in those cases where our hydroelectric power is not sufficient to meet the needs of that particular region.

Our situation is not unique. Other New England areas face a similar situation in that regard.

The Quoddy project, as has been so well set forth, is one that would depend upon a tremendous head of water unaffected by drought, a head that creates in effect about a 19-foot average head on the rise and fall of the tides.

As undoubtedly Congressman McIntire will convey to you, the theoretical potential that was developed as the result of the original studies indicated that somewhere in the vicinity of 20 billion kilowatts would be available.

The more practical, perhaps, or let us say, the usual New England conservative figure, shows that approximately 3 billion conservatively would be available. That is on a year-round basis—resulting in about 1 million horsepower availability.

Now let me get down to the specific things that would be benefited if such a development as this might take place.

In the first place, those who are familiar with that eastern region of Maine and who would study the figures would find that there has been a tremendous exodus of population.

Basically it is because of the fact that at the present time they have to depend almost entirely upon seasonal occupations to be able to derive their livelihood. It is basically fishing, sardine packing, a processing industry which is very limited in the number of weeks of work which is available for the people there.

Pulpwood operations are also taken in, because there is in that particular region some extensive growth of desirable woods for the pulp and paper industry.

In addition to that is the blueberry industry, where they create the largest pack, I believe in the entire country. In fact, a major portion of all the blueberries grown for canning purposes are grown in Washington County, Maine, which is the location of Quoddy.

As a result of that exodus of population, naturally the economy of that entire region has gone downhill. In order for it to be brought up, it is going to require something of this type to be able to bring about a real strengthening of the economy and a revitalizing of the entire region.

It is not only important to Maine, but to all of New England.

While I served as a governor, I had an opportunity to work very closely with the New England Conference of Governors and those governors at that time for over a period of 3 years or maybe 4, were strongly in favor of this particular survey being carried out, hoping that it would bring about facts that would result in the construction of Quoddy.

That same belief was shared by the New England Council made up of representative businessmen and financial men, industrialists, and so forth, over the New England region.

This is a vital source of engineering that is needed for the New England region and there is no other place in which a large block of power is available, other than at Quoddy.

Let me now touch upon the resources of the area and the developments that might result.

Undoubtedly, as most of you know, Maine does have at the present time what has been considered to be the largest deposit of manganese-bearing ore in the entire country.

In the Aroostook area which is close to the Washington County area, there are deposits there which have been conservatively estimated by the United States Bureau of Mines on just a very small portion of that survey, to be in excess of 250 million tons of manganese-bearing ore. Work is underway now as a result of a contract in developing a pilot plant operation to develop a method to extract the manganese.

The iron content of that ore is double the manganese content. You have a real potential for the development of the steel industry. You have both the iron ore and the manganese which is essential to the production of high quality steel. That is one.

The development of the electric furnace which requires a very constant and a very heavy demand of power is another possibility. This is particularly of interest because of the deep harbor facilities that are available in this area.

New Brunswick is in the same situation as Maine, they have a great lack of power. As Senator Smith has pointed out, the request for further facts does not come from the New Brunswick side of the picture, it comes from the Ottawa end.

New Brunswick people are very much interested in this because recently there have been uncovered in the New Brunswick region, deposits of strategic minerals and ores that can be vital both for Canada and also for our own needs, and to develop them to their fullest extent it is going to require adequate electric power to bring that about.

The pulp and paper industry is of tremendous importance to Maine.

At the St. Croix paper mill, they have practically exhausted all other potential sources of power unless they go into steam production from coal, as they have been doing recently, some of which they get from the New Brunswick region or Nova Scotia region.

However, it is low quality coal.

The hardwoods of Maine, as a result of recent developments, offer another new source of pulp for the newsprint industry. As many of you know, there has been some concern expressed because of the great utilization of the other types of wood in the pulp industry that was gradually wiping us out and the hardwoods are now being brought definitely into being and can be used for that purpose.

Copper: In the Blue Hill region which is just south of the area I mentioned, there were extensive deposits of copper uncovered during World War I and later were abandoned because of the fact that richer deposits were found elsewhere.

However due to the recent developments that have been brought into being through chemistry and scientific studies—they find they can now use that grade of copper and a present survey is under way by one of the big companies to see what use can be made in that area.

And here again, electric power and energy comes into the picture. In the production of fertilizers, certain types of fertilizers that are very necessary to our entire region—New England—have to come at the present time from other areas. The freight rate alone on one particular type that I am thinking of that is very vital to us, containing nitrogen, is in the vicinity of $24 a ton into the New England region.

Here again is a possibility for this to be developed.

On chlorine and caustic soda—and I might mention, incidentally, that this booklet that I am sure Congressman McIntire will make available to all members of the committee, is a booklet developed during the period I served as Governor, to point up the specific facts pertaining to Quoddy, the results which could be accomplished with this development and the basic facts surrounding the entire project.

On chlorine and caustic soda, as you know, salt water is the basic raw material. In the electrolysis project in the manufacture of caustic soda and chlorine, here again you have the soda, the salt water and of course you have to bring into play the electrolysis method which requires sizable quantities of electric power.

On aluminum, only recently I had a long talk with one of the members of the aluminum industry who indicated a real interest in a location in that northeast region and if sufficient quantities of firm power were available at what might be considered reasonable cost at which they would be definitely interested in developing the aluminum industry.

The aluminum industry itself is not so important, but the fabricating plants which follow in the light of a manufacturing plant of that type, or the aluminum plant itself, are very important to the economy not only of that location where the plant itself is, but all the way down through the railheads to the point of ultimate consumption, so that it means a great deal to New England in that regard.

Magnesium: As you know, there is one plant that is doing very well which I believe is presently located in Texas. Here again it requires sizable blocks of electric power. Magnesium, again, is extracted from the sea water. Here again is another opportunity for development.

There will be opportunities to go into other phases but I think those may possibly give to you an outline of the possibilities that are apparent if the development of this power is made possible as a result of the studies that the Maine delegation is asking consideration to be given.

It is of tremendous importance not to Maine alone, but to New Brunswick and to the rest of the New England States that are gradually finding that they just do not have the ability to produce hydroelectric power in sufficient quantities to be able to serve this type of heavy industry which uses such large blocks of firm power.

This would never be affected by drought as are the normal flows from the lakes and streams. It would be constant, day in and day out, as long as the earth is here because of the rise and fall, continually of the tides.

I am not going to go further because there may be some questions that you may want to ask and I believe that I have already utilized the time that I should in presenting these several facts to you.

I would, however, Mr. Chairman and members of the committee, be happy indeed to answer any questions if you have them.

Mr. MERROW. Senator Payne, you have given us a very comprehensive picture of the impact this would have on the economic development of the area.

I would like to ask if you would make a comparison of the power developed here, if this project were to go through, and the power that is already available in Maine. You said conservatively 3 billion kilowatts.

What is the Maine production of power at the moment?

Senator PAYNE. I am sorry I do not have those figures before me. I do not know whether Congressman McIntire has them or not, but we certainly can secure them.

Senator Smith, do you happen to have those?

Senator SMITH. No; I do not.

Senator PAYNE. If you are willing, I will secure those and see that they are made a part of the record.

Mr. MERROW. I think that would be helpful to show what this would develop as against what is being developed already.

(The information requested follows:)

UTILITY ELECTRIC GENERATING FACILITIES IN MAINE

The Federal Power Commission reports that at the close of 1952 the utility systems of Maine operated a total of 83 generating stations with a combined installed capacity of 476,500 kilowatts, of which 268,800 kilowatts or 56 percent was hydroelectric, 181,500 kilowatt or 38 percent steam-electric, and 26,400 kilowatts or 6 percent internal combustion.

No changes in installed capacity have been made or are planned during 1953.

Three utilities account for approximately 90 percent of this total.

The Central Maine Power Co. accounts for about 75 percent of the total. This consists of a total of 355,100 kilowatts, with 190,500 kilowatts hydroelectric and 164,600 fuel-electric.

The Bangor Hydro-Electric Co. has a total installed capacity of 58,500 kilowatts with 40,500 kilowatts hydroelectric and 18,000 kilowatts fuel-electric.

The Maine Public Service Co. has a total installed capacity of 30,400 kilowatts, which includes 11,500 kilowatts of hydro capacity just over the Canadian border that is used as a source of power for Maine. The company's installations include 13,800 kilowatts of hydroelectric power and 16,600 kilowatts of fuel-electric.

These three companies plan to make additions to their present capacity as follows: in 1954, 57,500 kilowatts; in 1955, 11,500 kilowatts; in 1956, 40,000 kilowatts; in 1957, 11,500 kilowatts.

In addition to its utility generating plants, Maine has 66 private industrial plants with a combined capacity of 246,000 kilowatts.

Mr. MERROW. There is one thing more in connection with this:

You made the point that it is valuable for the New England area. I believe under your law, you do not export power, but how would this work so that it would help the other States?

Senator PAYNE. Maine, as you have stated, under the so-called Fernald law does prohibit the export of power from the State, but under the provisions of the Quoddy authority, which was an act passed by the State legislature—I have forgotten the exact year—it provides expressly for the export of the power.

Mr. MERROW. And it would be feasible to export that power if it were developed, to the other States in New England?

Senator PAYNE. Yes.

Mr. MERROW. You stated an interesting fact with reference to the availability of ore in that part of the country. If the Passamaquoddy were developed, do you feel that it is possible to build a steel mill in eastern Maine?

Senator PAYNE. I believe there would be a steel mill built very definitely somewhere in that northeastern region. Of course, it would be economically feasible for a mill to be located somewhere close to that region because of the availability of the ore—and I do not know whether Congressman McIntire has the brochures in connection with manganese, or not, but it shows the closeness of this region to the source of the ore-bearing materials from Aroostook County.

There is also a tremendous amount of sulfur-bearing ore in another region, which is presently under study by one of the corporations—Freeport sulfur. They, too, believe that the ore body is of great importance and it has been claimed again by the United States Bureau of Mines, that this is the largest sulfur-bearing body of ore, east of the Mississippi River.

That leads on a line direct from Quoddy over that way and also from Aroostook, over there.

Mr. MERROW. This would be a tremendous stimulus to the economy of the entire region?

Senator PAYNE. That is right. It is not Maine, it is the entire region. There are natural resources laying there to be developed and this is the one opportunity for their being developed.

Mr. MERROW. Mrs. Bolton——

Mrs. BOLTON. Thank you, Mr. Chairman.

Welcome to our committee, Senator.

Senator PAYNE. Thank you very much.

Mrs. BOLTON. I did have a question with regard to the pulpwood. Is there any law in Maine which endorses a replanting of the areas that are cut over?

Senator PAYNE. There is no specific law, but I can say that there has been very marvelous cooperation and interest on the part of the large operators there, to plant seedlings and to maintain good conservation methods.

Mrs. BOLTON. That would be an exceedingly important thing for the whole area, would it not?

Senator PAYNE. Absolutely.

Mrs. BOLTON. Have they been doing that in the burned-over areas?

Senator PAYNE. They have been doing that some, but some of those areas because of the depth to which the burning has gone, it has destroyed the soil to a point where it has not been too good.

Mrs. BOLTON. You spoke of the hardwoods being used for newsprint, now.

Senator PAYNE. That is right.

Mrs. BOLTON. Is that not almost a misfortune to us all?

Senator PAYNE. No; I do not really share that belief, Mrs. Bolton, because these many areas that have been cut over, the softwoods have been taken out and they have left the growth of hardwoods. There actually has not been any economic value left for those, with the result that some landowners take and strip—in other words, you defeat the conservation purpose we are after.

They strip that which is salable and then abandon the lots afterward. Then you have a tax sale.

Where you can get a continual income as a result of hard and soft woods, when it comes into being, I think it can encourage a greater use of conservation methods and assure the owner of a reasonable staple crop of wood usage.

Mrs. BOLTON. Hard wood as well as soft?

Senator PAYNE. That is right.

Mrs. BOLTON. That is so terribly important for our water table and rain and flood situation and everything else.

Senator PAYNE. That is right.

Mrs. BOLTON. I would hope that Maine would take a second look and assure the rest of the country that that is going to be done.

What type of manganese is it? Is it the kind that is easily extracted?

Senator PAYNE. No, it is not.

Mrs. BOLTON. I judged that from what you said.

Senator PAYNE. It is of a type that is not easily extracted but a recent process which has been brought into being, which is the so-called Nossen process, developed by a gentleman in Paterson, N. J., which uses some form of nitric solution, a leaching process, has worked very well.

While I was Governor of the State, I asked Dr. Gaudin of the Massachusetts Institute of Technology to work on it and he observed the operation and was enthusiastic about the process. Only recently it has been gone over by the manganese panel in Washington and they have felt sufficiently encouraged so that they have permitted the construction of a pilot plant to go into it further.

Mrs. BOLTON. What byproducts would there be from what is left after the manganese is extracted?

Senator PAYNE. No. 1, your byproduct would be iron ore, which would be available for the steel industry; and if the nitric acid were not recycled and reclaimed as it went through the process, you, of course, would have the basis for a fertilizer.

Mrs. BOLTON. That is all being taken into consideration?

Senator PAYNE. That is right.

Mrs. BOLTON. What quality is the iron ore?

Senator PAYNE. The iron ore is of very good quality.

Mrs. BOLTON. Is it surface of is it down?

Senator PAYNE. It is down.

Mrs. BOLTON. What transportation would be developed to take out the results of the plants?

Senator PAYNE. The rail facilities are very close to both operations.

When I say both operations, there are two areas that have been studied. Even though this belt goes through most of Aroostook County, which as you know is a large county—one area they have estimated at 250 million tons of ore or better, is in a 5-square mile area just outside of Bridgewater. The rail connection is very close to that.

Mrs. BOLTON. May I just smile a little bit. I have traveled a little in Maine or tried to, andI have not found the rail facilities were as generously planned as in some other States. That is one reason for my question.

I hope there will be some development of all rail transportation that will perhaps include passenger traffic in the course of the development of the whole project.

Senator PAYNE. A development of this type, if it came into being, I think you would find the entire economy would be revitalized. With it would come transportation and all other phases of the economy.

Mrs. BOLTON. Is there water transportation possible to any of the areas in the South?

Senator PAYNE. Oh, yes. In fact Eastport is but one of many deep harbor facilities of the coast of Maine that lend themselves beautifully to waterborne transportation and low cost transportation.

Mrs. BOLTON. Thank you very much, Senator Payne.

Mr. MERROW. Mr. Vorys has come in.

We are very glad you came, Mr. Vorys.

Mr. VORYS. I am delighted to be here.

Mr. MERROW. Mr. Battle——

Mr. BATTLE. Thank you, Mr. Chairman. It is nice to see you, Senator, and I appreciate your testimony.

I had a couple of questions. I do not know whether they are answerable or not.

First I was wondering whether there was any general estimate of the cost of such a project. I suppose previously in some of these earlier studies there may have been some kind of an estimate that is possibly out of date, but is there any way to know at the present time in general figures, what we are shooting at, here?

Senator PAYNE. There is no way that I know of except through this survey that the delegation feels is a first step and a must, in order to develop not only cost of construction, but also the availability of the power and the rate at which the power could be produced for industry.

This is the basis of all of that information.

Mr. BATTLE. I am not sure to whom I should direct this next question.

Mrs. Smith touched on the idea a while ago of this not being a socialistic project. I am down close to the TVA area and as you know, TVA gets accused quite often of being socialistic. I am wondering how this could operate so as to effectively avoid such a charge?

Senator PAYNE. I do not know whether Senator Smith could touch on that, or not.

Mr. BATTLE. Of course, this would be an international proposition, but private enterprise would not eventually take over operations, would it?

Senator PAYNE. Let me just say this: I never got it correctly, but there was an inference that I think the members of the delegation will agree with me about, that there was some opposition to it by the private power companies.

I, however, can report to you that the major power companies of the State, the private companies have been most desirous of having this survey made in order to determine the basic facts.

Am I stating that correctly?

Mr. BATTLE. The TVA has meant a great deal to the whole area in addition to national defense. However, the charge of socialism must be faced.

Thank you, Mr. Chairman.

Mr. MERROW. Senator Smith, do you want to say anything on that point?

Senator SMITH. I was only going to add just a word about the public interest.

Of course it is such a large project and I would like to again emphasize that we are talking about the survey and not the construction because until we get the survey, no one is ever going to know whether it is right or wrong, and that is why I am directing my efforts toward that survey.

It is such a big project that it would necessarily have to have public financing. I can see no reason why private enterprise cannot join with the public financing or at least purchase the power, or work in cooperation with it. I think that could all be worked out. I feel that it can be.

Now the mislabel of "socialistic project" perhaps comes from the fact that there was the Quoddy Village up there and it was used as sort of an experiment and then turned over to the Youth Administration, and during that, the United States project was called a socialistic scheme. That is why I mentioned it in my report.

I was trying to clarify it and get it over into the international and out of the old Quoddy project. It does not have anything to do with the Quoddy Village or anything of that kind. It is an international project to determine whether or not we can use the tides to advantage.

Senator PAYNE. Congressman Battle raised a question, there. You will note in the brochure that the then Assistant Secretary of the Interior, Warren, speaking before the United States Chamber of Commerce in Washington, May 6, 1950, made this quote:

> Using the years from 1929 to 1947 as a yardstick, power-generating capacity in the New England States increased 48 percent. For the country as a whole, the increase averaged 77 percent. For the TVA States, 140 percent and for the Pacific Northwest, 146 percent. In this same period, total income in New England rose 91 percent while the increase for the country as a whole was 129 percent, for the TVA, 198 percent, and for the Pacific Northwest, 202 percent.

That certainly gives the trend of what happens as a result of sizable blocks of power being available.

Senator SMITH. Would the Senator yield there, Mr. Chairman?

Mr. MERROW. Senator Smith——

Senator SMITH. If it was determined that it was right to go along with the construction, it would be of vital interest to the Nation from the standpoint of the development of industries that are so vital to defense—national defense—and that is the reason why I introduced my bill back there in the earlier years, that we just have to think about

this national-defense program and the industries that could come out of that would be of tremendous help to Maine and to the New England area, but it would be of very, very much greater help to the national defense program.

Mr. MERROW. Mr. LeCompte——

Mr. LECOMPTE. Thank you, Senator, for your splendid statement, especially where it deals with potentials and the long-range possibilities of Quoddy.

I have no questions, except I just wanted to restate the statement you made about the rise and fall of the tide. Nineteen to twenty feet?

Senator PAYNE. That is right.

Mr. LECOMPTE. I am in an inland area and know nothing about tidewaters.

Senator PAYNE. It is the highest tidal range in the world.

Mr. LECOMPTE. That makes the power potential greater than any other spot in our land.

Senator PAYNE. Here again, in the brochure, you will see the two pictures of the low and the high tide, close to shore.

Mr. MERROW. Mr. Hays——

Mr. HAYS. Senator, one phase of your presentation was of special interest to me and that is the possibility of arresting an out-migration of people.

We have that same problem in my State. The figures, even, do not present it. When it shows a net loss of 50,000 people that is only part of it because we had a net gain of births over deaths of 282,000 people in 10 years so actually we lost a third of a million people going out of my State in a 10-year period.

Since your area is a good deal like my own—I have been through Maine and I love your State—I am very much interested in the development of little industries that will anchor people to the economic life of smaller towns and the villages.

Am I correct in concluding that this would have a very beneficial effect along that line, that you would probably not build in that area another Pittsburgh?

Senator PAYNE. No.

Mr. HAYS. I do not think you should, but you would have smaller cities which would have a good economic base, with electric power. Without power, people will continue to move out of there when they should stay.

Senator PAYNE. That is correct.

Mr. HAYS. I see the human phase of this in just as large proportions as I do the national defense angles, the development of manganese and steel.

I am very much impressed with that phase and I wanted to confirm it with you, that you feel there is a sound development and that it will come largely through the efforts of the people of the area themselves as they develop little industries in their community.

Senator PAYNE. It would bring people in there. As a result of a study I made in 1950 or 1951, it showed conclusive evidence that as a result of this lack of a stabilizing economy—in other words, the opportunity to get employment because of no basic industry being located in the region—that it showed the highest incidence of relief cost which continually mounts as a burden upon the communities and upon the State itself, as well as the Nation.

It resulted in showing that the greatest amount of equalization and educational subsidy at the State level was necessary to maintain and continue a minimum standard that was decent in education for that section is one that needs a very definite lift, which it would secure, as well as New Brunswick, which has the same need—they are in almost the the same position.

Mr. HAYS. Then it is true that electric power is the key to it. No matter how much agreement you get on the basic point that I made as a result of sociological studies. In our kind of competitive world there cannot be progress along this line without electric power. That is the key to the whole thing.

Senator PAYNE. That is right. You have your resources there undeveloped as of the present moment and with that development must come about a source of power that will result in the maximum development.

Mr. HAYS. This would be the first thing?

Senator PAYNE. That is correct.

Mr. MERROW. Mr. Vorys, have you any questions?

Mr. VORYS. No doubt this question has been covered, but I thought there had been a considerable survey prior to the chart that was made on this 15 or 20 years ago?

Senator PAYNE. May I say Senator Smith covered that very completely in a statement she made, which is available, here. What you are referring to was the American-side project which has been confused with this international project which is under discussion.

Mr. VORYS. What is wrong with the American project?

Senator PAYNE. It is not feasible.

People were confused not only here in Washington, but in the State because of the emphasis placed on the American-side project and they thought that was all that was being discussed. The international project is the original Dexter P. Cooper project. It is not just the American side.

Mr. VORYS. There must be a good bit of information available already. I have noticed one statement here with regard to five alternative plans. There must have been a good bit of engineering and information available.

Senator PAYNE. There was a report made in 1941. I think that Congressman McIntire is going to touch upon the engineering phase of this, so that it will be pretty well covered.

Mr. VORYS. Thank you.

Mr. MERROW. Mr. Carnahan.

Mr. CARNAHAN. I have but one brief question:

Do you have pulp mills in the area that are already using hard woods?

Senator PAYNE. Yes, sir. The Great Northern Paper Co. at Millinocket is starting now on the use of hard woods as a result of the development I speak of. Not to a great extent but they are starting slowly into it.

Mr. CARNAHAN. That is all, Mr. Chairman.

Mr. MERROW. Mr. Prouty.

Mr. PROUTY. Senator, I understood you to say that the present Maine statute prohibiting the export of power would not apply to this development?

Senator PAYNE. It will not apply to this development at all; no.

Mr. PROUTY. I think it is most encouraging to find members of the committee who are far removed from the New England area expressing a very definite interest in this proposal. I think most people would agree that we who live in New England have contributed quite substantially to the development of Federal power projects in other areas of the country and I think we all feel that if this should prove to be feasible that it is only reasonable that we be given serious consideration in that respect.

Thank you, Mr. Chairman.

Mr. MERROW. Senator Payne, you have certainly given us a comprehensive picture of the economic possibilities. I am very happy to have you with us and to have such a clear statement.

Senator PAYNE. Thank you very much and thank you for the opportunity.

Mr. MERROW. Mr. McIntire.

STATEMENT OF CLIFFORD G. McINTIRE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MAINE

Mr. MCINTIRE. Mr. Chairman and members of the committee, I had assigned myself a presentation which dealt more with the physical aspects of this project. I would like to qualify myself, here, as a farmer and not a hydraulic engineer in any respect, and not an electrical engineer.

In this project, in the southern corner of my district, which is the Third Maine District and consists of the north and northeast portions of the State, I have, of course, visited the area frequently and looked over the project as anyone could see it from a point of land.

I did want the committee to have some appreciation of the uniqueness of this project. I have some maps here which I think might help you understand the geography of it.

I have a prepared statement which I may follow to some extent and I may digress from it at points.

You have, I believe, the copy of the brochure that was published by the Governor, by Senator Payne when he was governor of Maine. It is a very excellent condensation of the matter and I hope that you will look it over.

Also, Mr. Chairman, I would like to place in the record at least up to page 26, a report, Details of Estimated Costs, Comprehensive Investigation of Tidal Power Project, dated May 1952, a report prepared by the Corps of Engineers, United States Army.

Mr. MERROW. That will be placed in the record.

(The document referred to will appear in the files of the committee:)

DETAILS OF ESTIMATE OF COST OF COMPREHENSIVE INVESTIGATION, PASSAMAQUODDY TIDAL POWER PROJECT

GENERAL

1. Introduction

This brochure outlines the details of the estimate of cost of a comprehensive investigation and report on the international plan for the Passamaquoddy tidal power project and supersedes the estimate contained in a similar brochure, dated February 1950. A joint investigation by the United States Geological Survey and the Corps of Engineers in the summer of 1951, using recently developed electronic depth-finder ("sonar") equipment, has resulted in preparation by the former agency of preliminary water depth and bedrock contour maps in areas

under consideration for the various features of the project. It is assumed that use of these data will materially reduce the cost of foundation explorations and thereby the cost of the entire investigation. This estimate includes provisions for spot checking the sonar data after the final plan for the entire project has been developed. A general description of the plans upon which this estimate is based follows.

2. Original international plan for Passamaquoddy

The original plan of development, as proposed by Dexter P. Cooper, Inc., was based upon the international two-pool scheme with Passamaquoddy Bay as high-level pool, and Cobscook Bay as low-level pool. The filling gates for Passamaquoddy Bay were located near Letite Passage to the north of Deer Island and served to maintain Passamaquoddy Bay at or near high-tide level. An international dam was to be built between the lower end of Deer Island and some point on Moose Island near Johnson Cove. Cobscook Bay was to be enclosed by dams from Pleasant Point to Moose Island and from Eastport to Lubec with emptying gates located between Treat and Dudley Islands to maintain Cobscook Bay as a lower-level pool. A powerhouse, located in Carryingplace Cove, would utilize water from Passamaquoddy Bay and discharge it into Cobscook Bay to generate continuous power in amounts that varied with the stage and range of the tide. The estimated maximum development called for not less than 50 units, each delivering about 20,000 horsepower under a head of 20 feet or a total of 1 million horsepower.

3. Current international plants for Passamaquoddy

The international plans for Passamaquoddy considered in this estimate report are two pool tidal power projects utilizing Passamaquoddy and Cobscook Bays. These plans fall into two basically different groups. One group utilizes Passamaquoddy and Cobscook Bays. In this group the area of the Passamaquoddy Bay pool is 101 square miles and the area of the Cobscook Bay pool is 27 square miles. The unfavorable ratio of pool areas of 3.8 is partially compensated in some alternates by powerhouse arrangements permitting direct discharge to the ocean during the low part of each tide cycle. The second group utilizes the same two pools and increases the area of the smaller to 38 square miles by the inclusion of Friar Roads. In this group the ratio of pool areas is 2.7. The five principal alternate plans included in the report of the International Passamaquoddy Engineering Board, dated March 1950, are as follows:

Alternate 1.—Passamaquoddy Bay as high-level pool, Cobscook Bay as low-level pool, and the powerhouse at Johnson Cove. The filling gates are located at Letite Passage and the emptying gates at Treat Island. Additional gates at the powerhouse permit tailrace discharge direct to the ocean. Auxiliary filling gates are provided at the powerhouse. Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

Alternate 2.—Passamaquoddy Bay as high-level pool, Cobscook Bay as low-level pool, and the powerhouse in Carryingplace Cove. The filling gates are located at Letite Passage and the emptying gates at Treat Island. Additional gates at the powerhouse permit tailrace discharge direct to the ocean. Auxiliary filling gates are provided at the powerhouse. Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

Alternate 3.—Passamaquoddy Bay as high-level pool, Cobscook Bay as low-level pool, and the powerhouse between Moose and Mathews Islands. The existing Carlow Island and Pleasant Point Dams are removed and a long dam is provided from the mainland near Nipps Island to Mathews Island. The filling gates are located at Letite Passage and emptying gates at Treat Island. Additional gates in the neck between Carryingplace and Johnson Coves and between Mathews and Moose Islands permit tailrace discharges direct to the ocean. Auxiliary filling gates are provided in the Deer Island Dam. Locks are provided in Letite Passage, Deer Island Dam, and Treat Island.

Alternate 4.—Passamaquoddy Bay as high-level pool, Cobscook Bay and Friar Roads as low-level pool, and the powerhouse at Bar Harbor. The filling gates are located at Letite Passage and emptying gates in the Pope Island and Lubec-Charleys Point Dams. Locks are provided at Letite Passage, Lubec, Deer Island Dam, and Pope Island Dam.

Alternate 5.—Cobscook Bay as high-level pool, Passamaquoddy Bay as low-level pool, and the powerhouse between Carlow Island and Pleasant Point. The filling gates are located at Treat Island and in the neck between Johnson and Carryingplace Coves. The emptying gates are located at Letite Passage and in the Deer Island Dam. Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

Allowance has been made in the estimate for surveys, investigations, and studies necessary for the consideration of these basic alternates with possible variations of alinement.

4. Auxiliary power projects

The operation of the international plan for Passamaquoddy with maximum possible installed capacity will involve considerable fluctuation in the electrical energy produced. One or more auxiliary power projects may be included in the plan for the purpose of increasing the dependable output. Considerable data are available on potential hydroelectric project sites in Maine and Canada as a result of surveys presently being made by the New England-New York Interagency Committee and the International St. John River Engineering Board. While auxiliary sources of energy have not been selected to operate in conjunction with Passamaquoddy, allowance has been made in this estimate for the inclusion of required studies.

DESCRIPTION OF ITEMS

1. Preliminary investigations

(*a*) *Review of previous studies.*—Data from several previous studies are available in the files of the New England division office. These include preliminary designs for the locks, gates, dams, powerhouse and pumped-storage reservoirs. The total volume of records amount to 31 boxes and 1,500 drawings. The cost of sorting and filing these records in convenient form for use in a survey investigation and report is estimated at $8,000.

(*b*) *Assembly of useful information.*—The assembly of useful information covers the coordination, reproduction and distribution of essential data prepared in previous studies for the use of units working on similar studies for this report. The information which would be assembled would be taken from previous studies on the Passamaquoddy tidal project and other related projects on which information is available. The work would include obtaining and disseminating information on high velocity currents and large low-head powerplants as necessary data for this project. The estimated cost of the assembly and reproduction of useful information is $13,000.

(*c*) *Reconnaissance surveys.*—Preliminary data obtained in connection with studies for the New England-New York Interagency Committee and the International St. John River Engineering Board indicate that auxiliary hydroelectric power, necessary for firming the power from the Passamaquoddy project, may be obtained at several sites in Maine and Canada. The estimated cost of obtaining the information necessary for the proper evaluation of these sites as part of the Passamaquoddy project is as follows:

Office work	$11,000
Field work	13,000
Total	24,000

(*d*) *Public hearings.*—Two public hearings will be required, one at Eastport, Maine, and one at St. Andrews, New Brunswick. The cost of these public hearings, including personnel and transportation charges, is estimated to be:

Preparation of maps and other data	$2,800
Salaries and transportation of personnel for hearings	2,200
Total	5,000

(*e*) *Total cost of preliminary investigations, $50,000*

2. Field surveys

Field surveys will include aerial, topographic, and geologic mapping of the pool areas and structure sites. A complete description of the work included is

contained in the estimate item for which the surveys will be obtained. The estimated cost of field surveys is as follows:

Survey	Descriptive paragraph	Cost
(a) Aerial surveys and maps:		
(1) Tidal pool areas	7a (1)	$100,000
(2) Auxiliary power projects	7a (2)	40,000
(3) Design of structures	8a	72,000
Total, aerial surveys		212,000
(b) Topographic surveys and maps:		
(1) Tidal structures	8b (1)	65,000
(2) Auxiliary power projects	8b (2)	26,000
Total, topographic surveys		91,000
(c) Geologic surveys:		
(1) Tidal project areas	8c	15,000
(2) Auxiliary power projects	8c	10,000
Total, geologic surveys		25,000
(d) Total cost of field surveys		328,000

3. Hydrographic investigations

(a) *Fathometric explorations of tidal pools.*—Sufficient fathometric soundings will be required in the following areas to develop 5-foot contours on a map with a scale of 1 inch equals 400 feet:

Item	*Area, square miles*
Deer Island Dam	3
Pope Island Dam—Head Harbor Passage	3
Letite Passage dams and filling gates	6
Additional areas in Cobscook Bay	6
Total	18

The estimated cost of fathometric explorations is $92,000.

(b) *Underwater velocities at tidal structures.*—Surveys will be required to determine the present underwater velocities at the various tidal structures proposed for the Eastport-Lubec area, Deer Island Dam area, Pope Island Dam area, and Letite Passage area. The cost of these surveys, to be obtained by two hydrographic survey parties, is estimated as follows:

Field work	$12,000
Office work	4,000
Total	16,000

(c) *Prediction of tides.*—It is proposed to set up 20 portable and 3 permanent tidal gaging stations in the area. The stations would be serviced and observed for a minimum period of 1 year. Weekly inspection of some stations by boat is included. The estimated cost of obtaining tidal data is as follows:

Portable stations, 20 at $400	$8,000
Permanent stations, 3 at $800	2,400
Observation and tabulation service	20,600
Boat rental, 100 days at $50	5,000
Total	36,000

(d) *Effect of wind, waves, and barometric pressures on water-surface elevations in the project.*—It is proposed to make observations and studies necessary

for a report comparing conditions at the project with studies made at Severn, England, and Rance, France. The estimated cost of this report is as follows:

Field observation	$9,000
Office study and report	5,000
Total	14,000

(*e*) *Stream gaging for auxiliary power projects.*—Gaging stations would be installed at potential auxiliary power project sites to determine hydrologic data for the drainage areas, and observations obtained for a 2-year period. Estimated costs:

Installation of gaging stations	$12,000
Observation and tabulation of data	12,000
Total	24,000

(*f*) *Total cost of hydrographic investigations, $182,000.*

4. Investigation of effects of tidal power project

(*a*) *Fisheries.*—The serious effect of the tidal structures on the fishing industry in the Quoddy area is appreciated. However, it is proposed that studies of the problem be deferred until such time as the definite project report is prepared. Previous estimates indicate that the study and investigation will cost $300,000. This is not included in the survey cost.

(*b*) *Miscellaneous.*—Miscellaneous investigations will be made of the effect of the tidal power project in other respects, such as related to recreation, railway, highway, and navigation facilities, at an estimated cost of $10,000.

5. Foundation explorations

(*a*) *Tidal project.*—(1) *Deepwater drilling.*—During the summer of 1951 tests were conducted jointly by the United States Geological Survey and the Corps of Engineers in the water areas between Eastport and Lubec to ascertain the accuracy of recently developed electronic depth-finder equipment in determining the depths of overburden. A comparison with the results obtained by borings in the same area, made by the Corps of Engineers in 1935–36, indicates that satisfactory results can be obtained by equipment of this type. Additional investigations were conducted in the Letite Passage area, the Pope Island area, Friar Roads, Spectacle Island area, Deer Island-Moose Island area, and the Lubec Narrows. Based on data obtained from these investigations, preliminary water-depth and bedrock-contour maps have been prepared by the Geological Survey. Final maps and report are in process of preparation. Preliminary studies will be based on these determinations and the most feasible plan for the project developed therefrom. Check borings will then be drilled to verify the accuracy of the electronic determinations. Drilling in water depths up to 300 feet is estimated to cost $250 per linear foot of drilling. These prices are based on data obtained from Merritt, Chapman & Scott, New London, Conn., and Mr. F. S. Lazier, consulting engineer, Toronto, Canada.

(2) *Land drilling.*—Additional drilling on land and in shallow water will be required in the powerhouse areas and at alternate locations of the filling and emptying gates. Five alternate locations of the powerhouse are under consideration. The powerhouse for alternate 2 is located in Carryingplace Cove where considerable foundation explorations were made by the Corps of Engineers in 1935–36. Since the proposed powerhouse for the international plan will be considerably larger than that considered in 1935–36, an additional area in Carryingplace Cove will be investigated. New foundation explorations will also be required at the powerhouse sites for the other 4 alternates.

(3) *Test pits and auger borings.*—Test pits and auger borings will be required to supplement information obtained from the boreholes at the alternate sites of the powerhouse, including the intake and discharge channels.

(4) *Estimated cost.*—A summary of the foundation explorations required for the tidal project and the total estimated cost are shown in table I and includes additional investigations by seismic explorations if found practicable.

TABLE I.—*Summary of foundation explorations, tidal project*

BORE HOLES

	Deep water drilling		Land and shallow water drilling	
	Number of drill holes	Assumed linear feet of drilling	Number of drill holes	Assumed linear feet of drilling
Dams	15	1,000	2	60
Filling gates	6	400	4	180
Emptying gates	4	300	9	390
Powerhouse (including head and tailrace areas)	5	300	35	1,370
Total	30	2,000	50	2,000

TEST PITS AND AUGER BORINGS, POWERHOUSE INCLUDING HEAD AND TAILRACE AREAS (5 ALTERNATES CONSIDERED)

		Deep water drilling	Land and shallow water drilling
Test pits	each	100	8 feet deep.
Auger borings	do	200	20 feet deep.

Estimated cost for foundation investigations, tidal project

30 deepwater drill holes, 2,000 linear feet at $250	$500,000
50 land drill holes, 2,000 linear feet at $18	36,000
100 test pits, 800 linear feet at $15	12,000
200 auger borings, 4,000 linear feet at $3	12,000
Seismic investigations	31,000
Total estimated cost, tidal project	591,000

(*b*) *Auxiliary power projects.*—Foundation explorations will also be required a auxiliary power projects in Maine and Canada. The estimated cost is $32,000.

(*c*) *Total cost of foundation explorations, $623,000.*

6. Materials and laboratory investigations

(*a*) *Tests and analyses.*—Laboratory analyses for the report will be prepared in laboratories at Eastport, Maine. The soils laboratory will handle investigation and classification of boring material from all sources. The concrete laboratory will make preliminatry examinations of possible concrete aggregates and locate and select a source of material suitable for each type of construction.

(1) *Fountain samples.*—The examination and classification of foundation material from the various structure sites is estimated to cost $43,000.

(2) *Overburden under deepwater tidal dams.*—Studies, including models, would be made of the overburden under the deepwater tidal dams. These studies would include restudies of the previous investigations on Eastport and Lubec Dams, as well as the new sites. The estimated cost of these studies is $24,000.

(3) *Concrete aggregates.*—Concrete aggregate investigations and laboratory tests will include location of sources of material, preliminary testing and other laboratory work involved in concrete mix design. The estimated cost of the concrete laboratory is $87,000.

(4) *Fill material for dams.*—Possible sources of suitable rock and earth fill will be investigated with borings, quarrying, and test pits in areas adjacent to the various dams. The estimated cost of the selection of embankment material is $76,000.

(5) *Effect of sea water, moisture, and waves on structures and equipment.*—The effect of sea water, moisture and waves on structures and equipment will be studied to determine the effectiveness of the materials used in the various locations. It is estimated that this work will cost $17,000.

(*b*) *Model tests.*—Due to the unusual nature of the project, several models will be required to complete a design.

(1) *Filling and emptying structures.*—Model tests to determine the hydraulic design of the filling and emptying gates are estimated to cost $30,000.

(2) *Effect of water velocities.*—Model tests will be required to determine the effect of discharge velocities on the dam slopes near the filling and emptying gates, as well as in the vicinity of the powerhouse. In addition, the movement of bed load materials will be studied under this item. The estimated cost of these studies is $20,000.

(3) *Effect of high waves on slope material.*—Model tests will be required to determine the effect of ocean storms on the proposed dams and the necessary riprap thickness. The estimated cost of these studies is $25,000.

(4) *Navigation locks.*—The effect of filling or emptying gates on contiguous navigation locks will be studied at an estimated cost of $20,000.

(5) *Rock fill dams.*—Model studies of methods of placement and the size of material required for construction of the dams are estimated to cost $20,000.

(*c*) *Total cost of materials and laboratory investigations, $362,000.*

7. *Hydraulic and power studies*

(*a*) *Aerial surveys and maps.*—(1) *Tidal pool areas.*—The Passamaquoddy project includes 3 water areas as follows: Passamaquoddy Bay, Cobscook Bay, and Friar Roads. In alternates 1, 2, and 3, Passamaquoddy Bay would be utilized as the high pool and Cobscook Bay as the low pool. Since the high pool will have an area far in excess of the low pool, the maximum possible power output will be controlled by the capacity of the low pool in Cobscook Bay. In normal operation of these alternates with maximum feasible capacity, the high pool would fluctuate 3 feet and the low pool 9 feet. In alternate 4 the capacity will be increased by more than 120,000 kilowatts with the inclusion of Friar Roads in the low pool. This alternate will require a dam across Frair Roads at Pope Island and a relocation of the dam at Lubec. The area involved has been included in the low-pool survey. In alternate 5, Cobscook Bay would be utilized as the high level pool and Passamaquoddy Bay as the low-level pool. Since Cobscook Bay will be subject to major fluctuation, will incur considerable navigation damages, and is a vital factor in the determination of the capacity of the project, the survey will include the entire shoreline between elevations −10 and +20 mean sea level. The surveys would consist of an aerial map to a scale of 1 inch equals 400 feet, and topographic plans to a scale of 1 inch equals 400 feet with contour intervals of 5 feet. The estimated cost, based on recent aerial survey quotations, is $100,000 and is included in item 2.

(2) *Auxiliary power projects.*—The locations of auxiliary power sites cannot be predicted at this time since no sites have been finally selected, nor has it been determined that auxiliary power will be included. Considerable information is available from surveys made in connection with studies by the New England-New York Inter-Agency Committee and the International Saint John River Engineering Board. It is assumed that one new reservoir would be surveyed. The estimated cost provides for a mosaic and topographical plans to a scale of 1 inch equals 400 feet, with 10-foot contours. The estimated cost of the survey for the auxiliary power site is $40,000 and is included in item 2.

(*b*) *Studies.*—Hydraulic and power studies will include two phases as follows:

(1) *Tidal project.*—This item includes the hydraulic design of the filling and emptying gate structures, the navigation locks, powerhouse head and tailrace, and the rockfill dam closures; coordination of the tide gage survey; studies of head duration and frequency; determination of the amount and characteristics of power available from the tidal project; and its coordination with auxiliary project outputs and with potential market requirements. The estimated cost is $100,000.

(2) *Auxiliary power projects.*—These studies will determine the most suitable auxiliary power sites and the capacity of the sites for firming the tidal power. The estmiated cost is $94,000.

(*c*) *Total cost of hydraulic and power studies, $194,000.*

8. *Design of project structures*

(*a*) *Aerial surveys and maps.*—Aerial surveys and maps, similar to those described in paragraph 7a above, are required for preliminary studies of the various features. The estimated cost of these surveys is $72,000 and is included in item 2.

(*b*) *Topographic surveys and maps.*—(1) *Tidal structure sites.*—Survey maps, suitable for layout and design purposes to a scale of 1 inch equals 100 feet, and 1 inch equals 200 feet, are available from previous studies for the 1-pool project, including the powerhouse area at Carryingplace Cove, Pleasant Point Dam, and Carlow Island Dam. Additional surveys will be required for two alternate

sites of the powerhouse, locks, emptying gates, and possible dams at Pope Island and Lubec, and the shore of Deer Island. The tidal area to be surveyed covers 600 acres. An additional 600-acre survey will be required in the Letite Passage area for the study of alternate dam sites, filling gates, and locks. All the above surveys would be made to a scale of 1 inch equals 100 feet, with contour interval of 2 feet. The total estimated cost of these surveys is $65,000 and is included in item 2.

(2) *Auxiliary power structure sites.*—Potential hydroelectric power sites on the Kennebec, Penobscot, and Saint John Rivers, capable of firming the output from the tidal project, are currently being studied by the New England-New York Inter-Agency Committee and the International Saint John River Engineering Board. Possible sites in New Brunswick will be considered before a definite selection can be made. The total required survey area for these latter sites is estimated as 450 acres. The surveys would be made to a scale of 1 inch equals 100 feet, with contour interval of 2 feet. The estimated cost of these surveys as $26,000 and is included in item 2.

(*c*) *Geologic surveys.*—A geologic report on the Passamaquoddy area is in process of preparation by the United States Geological Survey, based on investigations made during the summer of 1951. It is estimated that the cost of geologists, with engineering assistance and draftsmen, required to determine additional geology of the areas involved in these projects is $25,000 and is included in item 2.

(*d*) *Design studies.*—(1) *Tidal project.*—(a) *Dams.*—The design of the earth dams for the tidal project will be accomplished in two parts. The first part will be handled under "Item 6, Materials and laboratory investigations," wherein the section of the dam will be designed. The actual layouts of the dams will be determined under this item at an estimated cost of $73,000.

(b) *Filling and emptying structures.*—The design of the filling and emptying structures, including the coordination of the work under items 6 and 7, is estimated to cost $81,000.

(c) *Navigation locks.*—It is estimated that design of the navigation locks between Passamaquoddy Bay and the Atlantic Ocean, and between Cobscook Bay and the Atlantic Ocean will cost $48,000.

(d) *Powerhouse.*—Determination of the structural requirements of the powerhouse and the arrangement of all equipment in the powerhouse and switchyard for the alternate locations is estimated to cost $113,000.

(e) *Relocations.*—The preparation of preliminary studies and estimates for necessary highway and railroad relocations for the tidal project is estimated to cost $35,000.

(2) *Auxiliary power projects.*—(a) *Dams.*—Design studies in connection with auxiliary power projects will be made at an estimated cost of $36,000.

(b) *Powerhouse.*—The design of the powerhouses and switchyards for the auxiliary power projects will be prepared at an estimated cost of $60,000.

(c) *Relocations.*—General preliminary studies and comparative cost estimates of highway and railroad relocations for auxiliary hydroelectric projects will be prepared at an estimated cost of $33,000.

(*e*) *Summary of cost of design studies.*—A summary of the cost of the design studies is given in table II.

TABLE II.—*Summary of cost of design studies and surveys*

Description of item	Aerial surveys [1]	Topographic surveys [1]	Geologic surveys [1]	Design studies [2]	Total
(1) Tidal project :					
(*a*) Dams	0	$30,000	$3,000	$73,000	$106,000
(*b*) Filling and emptying structures	$19,000	10,000	3,000	81,000	113,000
(*c*) Navigation locks	13,000	8,000	3,000	48,000	72,000
(*d*) Powerhouse	0	17,000	4,000	113,000	134,000
(*e*) Relocations	20,000	0	2,000	35,000	57,000
(2) Auxiliary power projects:					
(*a*) Dams	0	16,000	5,000	36,000	57,000
(*b*) Powerhouse	0	10,000	4,000	60,000	74.000
(*c*) Relocations	20,000	0	1,000	33,000	54,000
Total	[1] 72,000	[1] 91,000	[1] 25,000	[2] 479,000	667,000

[1] Included in item 2, "Field surveys."
[2] Included in item 8, "Design studies."

9. Construction plant and facilities

The construction of the earth dams involved in this project will be a major undertaking in view of the adverse conditions involved as well as the magnitude of the construction itself. A group of engineers, with adequate drafting force, will be required to determine the construction methods, size, and location of construction camps, roads, yards, and other similar items. The total cost is estimated at $40,000.

10. Lands and rights-of-way

The evaluation of lands and rights-of-way required for the tidal project and auxiliary projects is estimated to cost $50,000.

11. Power market for project output

Studies will be made of known existing and potential power markets in New England and corresponding areas in Canada and also of possible industrial markets which could be developed in the vicinity of the project and which could be served profitably by the tidal project. The estimated costs of these studies are as follows:

United States	$42,000
Canada	20,000
Total	62,000

12. Transmission system to power markets

The cost of preliminary layouts and designs for a transmission system from the tidal and auxiliary power projects to potential markets for the project output is estimated as follows:

United States	$15,000
Canada	6,000
Total	21,000

13. Cost estimates

Cost estimates for the selected plans will be prepared at an estimated cost of $75,000.

14. Alternate sources of power supply

The development of costs of power at the tidal project market from fuel electric plants and from potential hydroelectric projects in Maine and New Brunswick is estimated to cost:

	United States	Canada	Total
Fuel electric plants	$2,000	$6,000	$8,000
Hydroelectric plants	10,000	24,000	34,000
Total	12,000	30,000	42,000

15. Preparation of report

This item includes the preparation of the report on the entire investigation with conclusions derived therefrom on the practical and economic feasibility and the desirability of any Passamaquoddy tidal power project. This item also includes the printing or other type of reproduction of the report. The total estimated cost is $98,000.

16. Consulting Service

The complexity of the project and the difficult construction problems involved require an adequate consulting force. It is anticipated that the services of seven consulting engineers will be required for the project. The cost of their services for 60 days each, including travel expenses and per diem, is estimated to be $84,000.

17. Administration and overhead

Administrative and overhead costs have been included in the estimated cost of the preceding items as applicable.

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18. Total costs

The total estimated cost of the comprehensive investigation described in the preceding paragraphs (see tables III and IV) is $2,700,000.

TABLE III.—*International Passamaquoddy tidal power project—Estimate of cost of comprehensive investigation*

Item	Estimates by United States	Estimates by Canada	Total estimated cost
1. Preliminary investigations:			
(a) Review of previous studies	$8,000		
(b) Assembly of useful information	13,000		
(c) Reconnaissance surveys	24,000		
(d) Public hearings	5,000		
Total, item 1	50,000		$50,000
2. Field surveys:			
(a) Aerial surveys and maps:			
(1) Tidal pool areas	100,000		
(2) Auxiliary power projects	40,000		
(3) Design of structures	72,000		
Subtotal, aerial surveys	212,000		
(b) Topographic surveys and maps:			
(1) Tidal structures	65,000		
(2) Auxiliary power projects	26,000		
Subtotal, topographic surveys	91,000		
(c) Geologic surveys:			
(1) Tidal project area	15,000		
(2) Auxiliary power project	10,000		
Subtotal, geologic survey	25,000		
Total, item 2	328,000		328,000
3. Hydrographic investigations:			
(a) Fathometric explorations of tidal pools	92,000		
(b) Underwater velocities at tidal structures	16,000		
(c) Prediction of tides	36,000		
(d) Effect of wind, waves, and barometric pressures on water surface elevations in the project	14,000		
(e) Stream gaging for auxiliary power projects	24,000		
Total, item 3	182,000		182,000
4. Investigation of effects of tidal power project		$10,000	10,000
5. Foundation explorations:			
(a) Tidal project	591,000		
(b) Auxiliary power projects	32,000		
Total, item 5	623,000		623,000
6. Materials and laboratory investigations:			
(a) Tests and analyses:			
(1) Foundation samples	43,000		
(2) Overburden under deep-water tidal dams	24,000		
(3) Concrete aggregates	87,000		
(4) Fill material for dams	76,000		
(5) Effect of sea water, moisture, and waves on structures and equipment	17,000		
Subtotal, tests and analyses	247,000		
(b) Model tests:			
(1) Filling and emptying structures	30,000		
(2) Effect of water velocities	20,000		
(3) Effect of high waves on slope material	25,000		
(4) Navigation locks	20,000		
(5) Rock-fill dams	20,000		
Subtotal, model tests	115,000		362,000

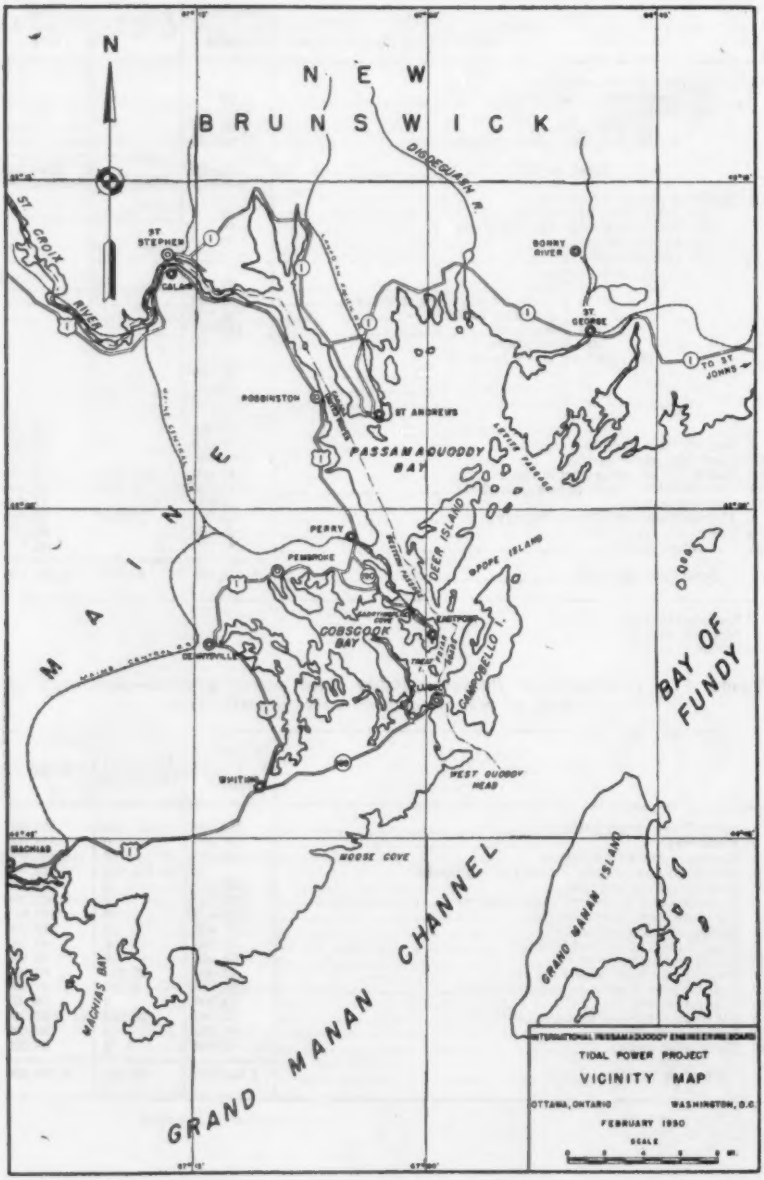
TABLE III.—*International Passamaquoddy tidal power project—Estimate of cost of comprehensive investigation*—Continued

Item	Estimates by United States	Estimates by Canada	Total estimated cost
7. Hydraulic and power studies:			
(a) Aerial surveys and maps	(1)		
(b) Studies:			
(1) Tidal project	$100,000		
(2) Auxiliary power projects	94,000		
Total, item 7	194,000		$194,000
8. Design of project structures:			
(a) Aerial surveys and maps	(1)		
(b) Topographic surveys and maps	(2)		
(c) Geologic surveys	(3)		
(d) Design studies			
(1) Tidal project:			
(a) Dams	73,000		
(b) Filling and emptying structures	81,000		
(c) Navigation locks	48,000		
(d) Powerhouse	113,000		
(e) Relocations	35,000		
(2) Auxiliary power projects:			
(a) Dams	36,000		
(b) Powerhouse	60,000		
(c) Relocations	33,000		
Total, item 8	479,000		479,000
9. Construction plant and facilities	40,000		40,000
10. Lands and rights-of-way	50,000		50,000
11. Power market for project output	42,000	$20,000	62,000
12. Transmission system to power markets	15,000	6,000	21,000
13. Cost estimates	75,000		75,000
14. Alternate sources of power supply	12,000	30,000	42,000
15. Preparation of report	98,000		98,000
16. Consulting service	84,000		84,000
Total estimated cost	2,634,000	66,000	2,700,000

[1] Included in 2 (a).
[2] Included in 2 (b).
[3] Included in 2 (c).

TABLE IV.—*International Passamaquoddy tidal power project—Summary of estimate of cost of comprehensive investigation*

Item	Estimates by United States	Estimates by Canada	Total
1. Preliminary investigations	$50,000	0	$50,000
2. Field surveys	328,000	0	328,000
3. Hydrographic investigations	182,000	0	182,000
4. Investigation of effects of tidal power projects	0	$10,000	10,000
5. Foundation explorations	623,000	0	623,000
6. Materials and laboratory investigations	362,000	0	362,000
7. Hydraulic and power studies	194,000	0	194,000
8. Design of project structures	479,000	0	479,000
9. Construction plant and facilities	40,000	0	40,000
10. Lands and rights-of-way	50,000	0	50,000
11. Power market for project output	42,000	20,000	62,000
12. Transmission system to power markets	15,000	6,000	21,000
13. Cost estimates	75,000	0	75,000
14. Alternate sources of power supply	12,000	30,000	42,000
15. Preparation of report	98,000	0	98,000
16. Consulting service	84,000	0	84,000
Total estimated cost	2,634,000	66,000	2,700,000


N
NEW
BRUNSWICK
MAINE
ST CROIX RIVER
ST STEPHEN
CALAIS
DISTRIGUASH R.
BONNY RIVER
ST GEORGE
TO ST JOHNS
ROBBINSTON
ST ANDREWS
PASSAMAQUODDY BAY
PERRY
PENNFIELD
DEER ISLAND
CAMPOBELLO I.
COBSCOOK BAY
BAY OF FUNDY
WHITING
WEST QUODDY HEAD
MACHIAS
MOOSE COVE
MACHIAS BAY
GRAND MANAN CHANNEL
GRAND MANAN ISLAND
INTERNATIONAL PASSAMAQUODDY ENGINEERING BOARD
TIDAL POWER PROJECT
VICINITY MAP
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1930
SCALE

BRIEF DESCRIPTION OF ALTERNATE 1

International power project as originally planned by Dexter P. Cooper.

Passamaquoddy Bay is utilized as high-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam).

Cobscook Bay is utilized as low-level pool with closure dams between Eastport, Treat Island and Lubec. The powerhouse is located at Johnson Cove. The water area of Passamaquoddy Bay, high-level pool, is 100.5 square miles and Cobscook Bay area, low-level pool, is 26.5 square miles. The ratio of pool areas is 3.8 to 1.

The filling gates are located at Letite Passage and at the westerly end of Deer Island Dam. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates near the powerhouse permit turbine discharge direct to the ocean during approximately 5 hours of a tide cycle. During this time the reversible head gates, located in the tailrace channel leading from the powerhouse into the low-level pool, are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent. The average net head at the powerhouse is correspondingly increased.

Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

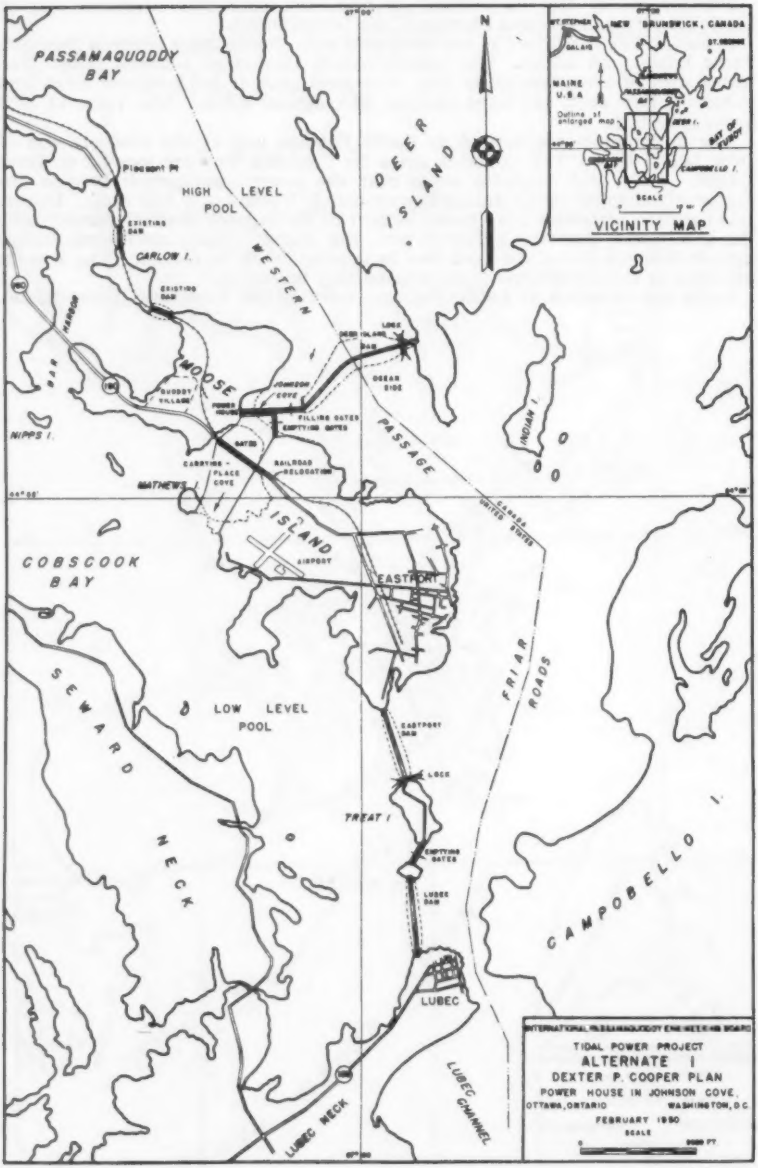

PASSAMAQUODDY BAY
HIGH LEVEL POOL
DEER ISLAND
WESTERN
CARLOW I.
EXISTING DAM
MOOSE
JOHNSON COVE
OCEAN SIDE
FILLING GATES
EMPTYING GATES
RAILROAD RELOCATION
NIPPS I.
MATHEWS I.
PASSAGE
INDIAN I.
ISLAND
AIRPORT
EASTPORT
COBSCOOK BAY
LOW LEVEL POOL
SEWARD NECK
FRIAR ROADS
EASTPORT DAM
LOCK
TREAT I.
LUBEC DAM
LUBEC
LUBEC NECK
LUBEC CHANNEL
CAMPOBELLO I.
N
NEW BRUNSWICK, CANADA
MAINE U.S.A.
VICINITY MAP
TIDAL POWER PROJECT
ALTERNATE I
DEXTER P. COOPER PLAN
POWER HOUSE IN JOHNSON COVE
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1950

PLATE I

BRIEF DESCRIPTION OF ALTERNATE 2

Modified international tidal power project as originally planned by Dexter P. Cooper.

This alternate is similar to alternate 1, utilizing Passamaquoddy Bay as high-level pool with closure dams at Letite Passage and Western Passage. Cobscook Bay as low-level pool will have closure dams between Eastport, Treat Island, and Lubec. The powerhouse is, however, located at Carryingplace Cove. The water area of Passamaquoddy Bay, high-level pool, is 100.5 square miles, and Cobscook Bay, low-level pool, is 26.5 square miles. The ratio of pool areas is 3.8 to 1.

The filling gates are located at Letite Passage and between Johnson and Carryingplace Coves. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates near the powerhouse permit turbine discharge direct to the ocean. During this time the reversible headgates, located inthe tailrace channel leading from the powerhouse into low-level pool, are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent. The average net head at the powerhouse is correspondingly increased.

Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

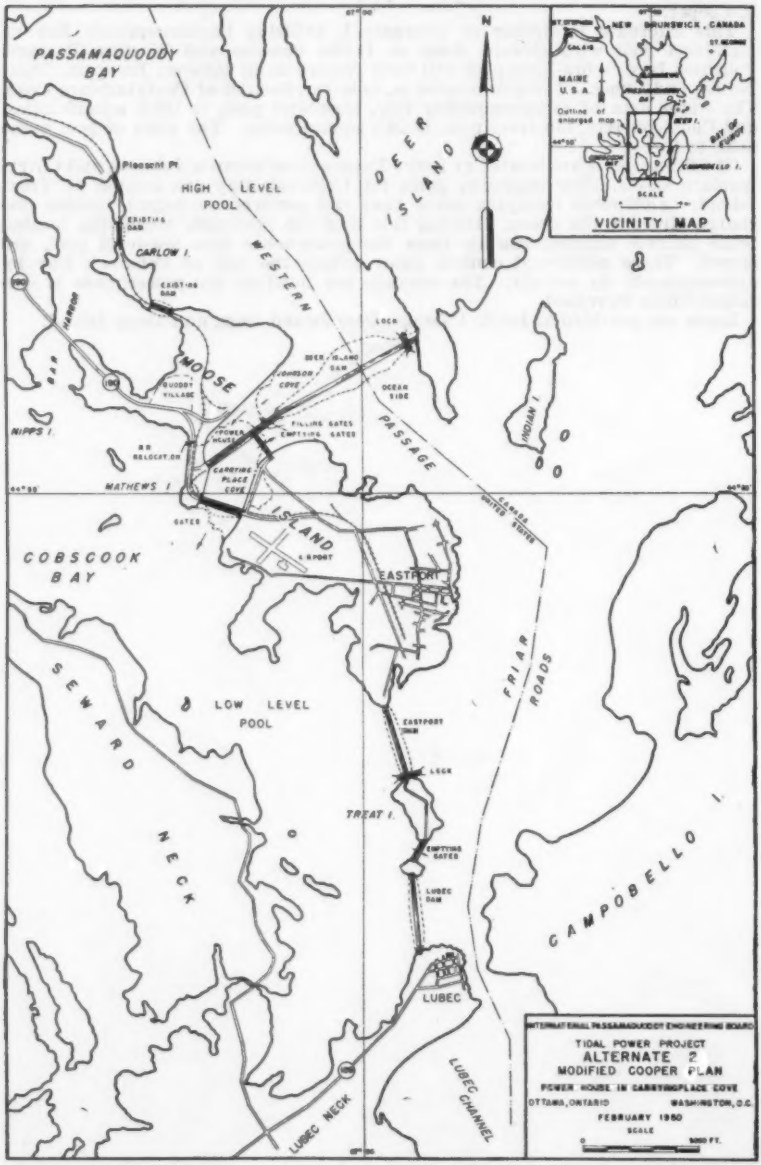

PASSAMAQUODDY BAY
HIGH LEVEL POOL
DEER ISLAND
WESTERN
Pleasant Pt
CARLOW I.
EXISTING DAM
MOOSE
BUDDY VILLAGE
NIPPS I.
MATHEWS I
POWER HOUSE
FILLING GATES
EMPTYING GATES
CARRYING PLACE COVE
LOCK
OCEAN SIDE
PASSAGE
INDIAN I
ISLAND
COBSCOOK BAY
EASTPORT
LOW LEVEL POOL
SEWARD NECK
FRIAR ROADS
TREAT I.
LUBEC DAM
LUBEC
CAMPOBELLO I
LUBEC NECK
LUBEC CHANNEL
N
NEW BRUNSWICK, CANADA
MAINE U.S.A.
Outline of enlarged map
VICINITY MAP
TIDAL POWER PROJECT
ALTERNATE 2
MODIFIED COOPER PLAN
POWER HOUSE IN CARRYINGPLACE COVE
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1960
SCALE

PLATE 2

BRIEF DESCRIPTION OF ALTERNATE 3

Passamaquoddy Bay is utilized as high-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). Cobscook Bay is utilized as low-level pool with closure dams between Eastport, Treat Island, and Lubec. The powerhouse is located between Moose and Mathews Islands. The existing Carlow Island and Pleasant Point Dams are removed and a long shallow dam is provided from the mainland near Nipps Island to Mathews Island to form an approach channel through Bar Harbor. The water area of Passamaquoddy Bay, high-level pool, is 101.5 square miles. The ratio of pool areas is 4.0 to 1.0.

The filling gates are located at Letite Passage and at the westerly end of Deer Island Dam. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates at Johnson Cove permit turbine discharge direct to the ocean during approximately five hours per tide cycle. During this time the reversible headgates, located in the tailrace channel leading from the powerhouse into the low-level pool, are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent. The average net head at the powerhouse is correspondingly increased.

Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

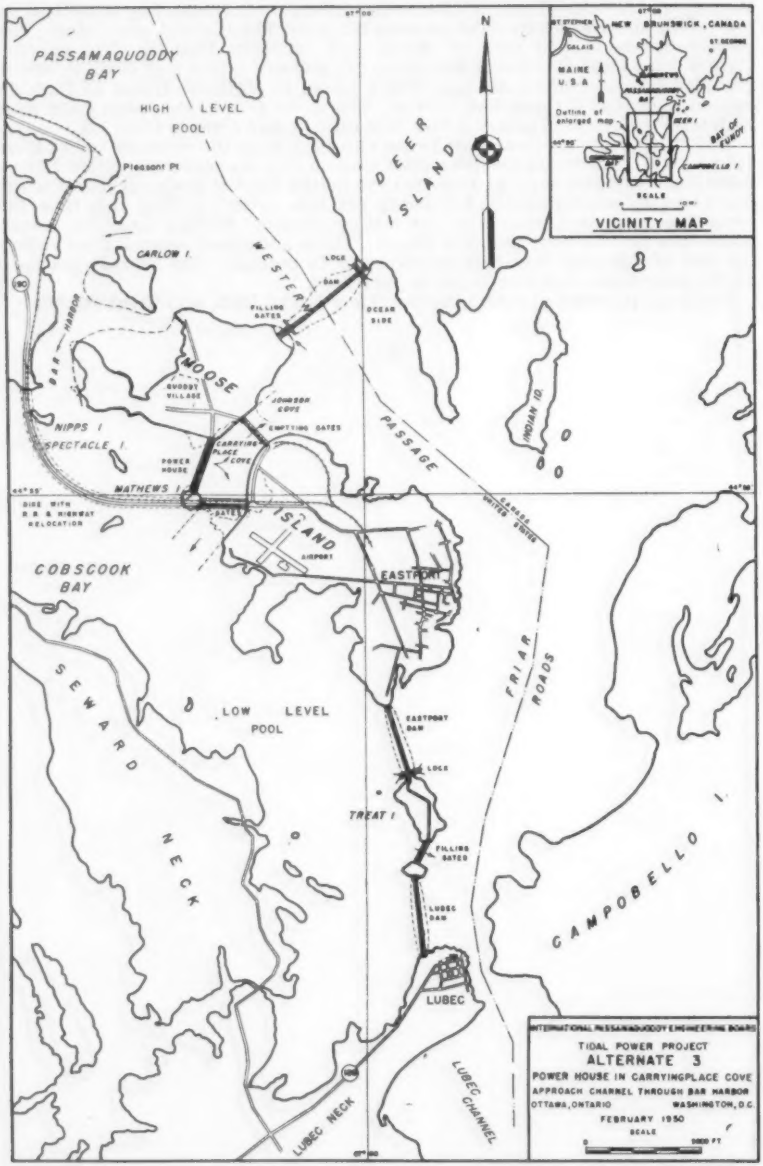

PASSAMAQUODDY BAY
HIGH LEVEL POOL
Pleasant Pt
DEER ISLAND
N
VICINITY MAP
NEW BRUNSWICK, CANADA
MAINE U.S.A.
BAY OF FUNDY
CARLOW I.
WESTERN
LOCK
DAM
FILLING GATES
OCEAN SIDE
BAR HARBOR
MOOSE
PASSAGE
INDIAN ID.
NIPPS I.
SPECTACLE I.
POWER HOUSE
MATHEWS I.
ISLAND
AIRPORT
COBSCOOK BAY
EASTPORT
SEWARD NECK
LOW LEVEL POOL
FRIAR ROADS
EASTPORT DAM
TREAT I.
LUBEC DAM
LUBEC
CAMPOBELLO I.
LUBEC NECK
LUBEC CHANNEL
TIDAL POWER PROJECT
ALTERNATE 3
POWER HOUSE IN CARRYINGPLACE COVE
APPROACH CHANNEL THROUGH BAR HARBOR
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1950
SCALE

PLATE 3

BRIEF DESCRIPTION OF ALTERNATE 4

Passamaquoddy Bay is utilized as high-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). Cobscook Bay and Friar Roads are utilized as low-level pool with closure dams between Campobello Island and Deer Island (Pope Island Dam) and between Lubec and Charley's Point (Lubec Channel Dam). The powerhouse is located at Bar Harbor approximately one-half mile south of the Highway Bridge. The water area of Passamaquoddy Bay, high-level pool, is 102.5 square miles, and Cobscook Bay, including Friar Roads, low-level pool, area is 37.5 square miles. The ratio of pool areas is 2.7 to 1.0.

All filling gates are located at Letite Passage. The emptying gates for Cobscook Bay and Friar Roads are located at Pope Island and Lubec Channel Dams.

Locks are provided at Letite Passage, Lubec, Deer Island Dam, and Pope Island Dam.

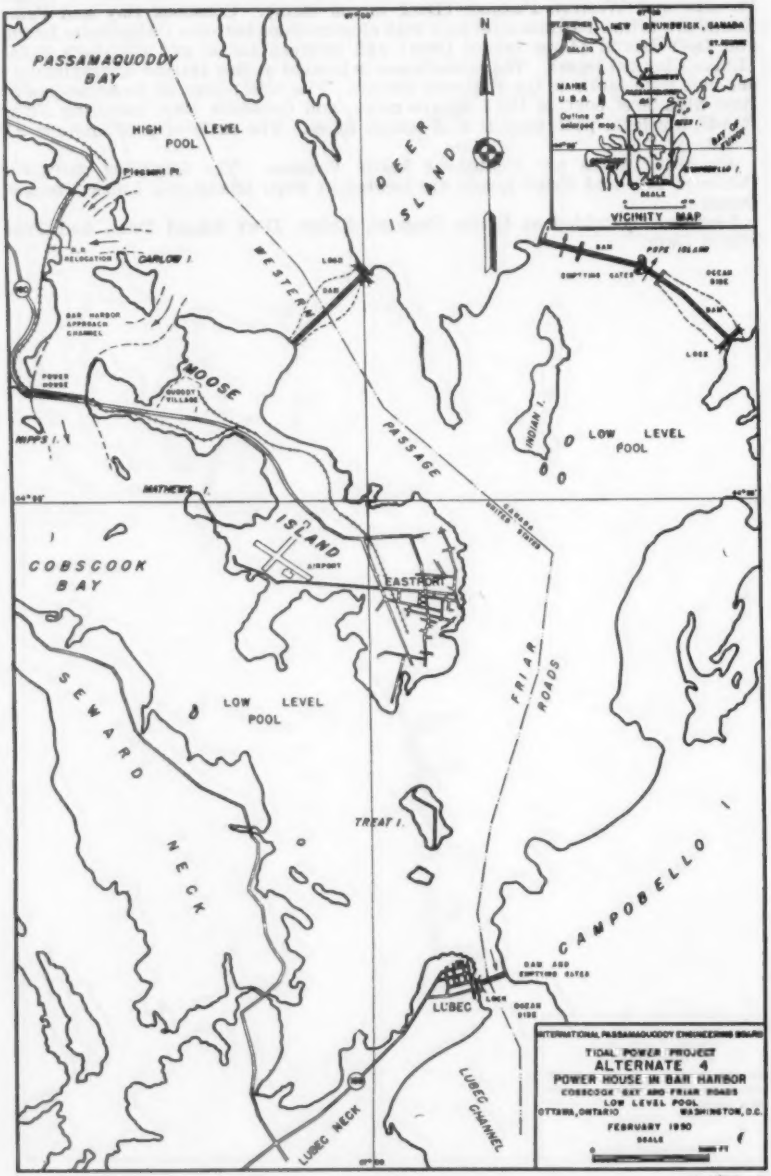

PASSAMAQUODDY BAY
HIGH LEVEL POOL
DEER ISLAND
WESTERN
MOOSE
PASSAGE
INDIAN I.
LOW LEVEL POOL
MATHEWS I.
ISLAND
COBSCOOK BAY
EASTPORT
AIRPORT
FRIAR ROADS
SEWARD NECK
LOW LEVEL POOL
TREAT I.
CAMPOBELLO I.
LUBEC
LUBEC CHANNEL
LUBEC NECK
POPE ISLAND
OCEAN SIDE
BAR HARBOR APPROACH CHANNEL
POWER HOUSE
CARLOW I.
MAINE U.S.A.
NEW BRUNSWICK, CANADA
VICINITY MAP
INTERNATIONAL PASSAMAQUODDY ENGINEERING BOARD
TIDAL POWER PROJECT
ALTERNATE 4
POWER HOUSE IN BAR HARBOR
COBSCOOK BAY AND FRIAR ROADS
LOW LEVEL POOL
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1930
SCALE

PLATE 4

BRIEF DESCRIPTION OF ALTERNATE 5

Cobscook Bay is utilized as high-level pool with closure dams between Eastport, Treat Island, and Lubec. Passamaquoddy Bay is utilized as low-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). The powerhouse is located between Carlow Island and Pleasant Point. Cobscook Bay as high-level pool is 37.5 square miles, and the water area of Passamaquoddy Bay, low-level pool, is 94 square miles. The ratio of pool area is 2.5 to 1.

The filling gates are located at Treat Island and in the neck between Carrying-place and Johnson Coves. The emptying gates are at Letite Passage and at the westerly end of Deer Island Dam.

Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

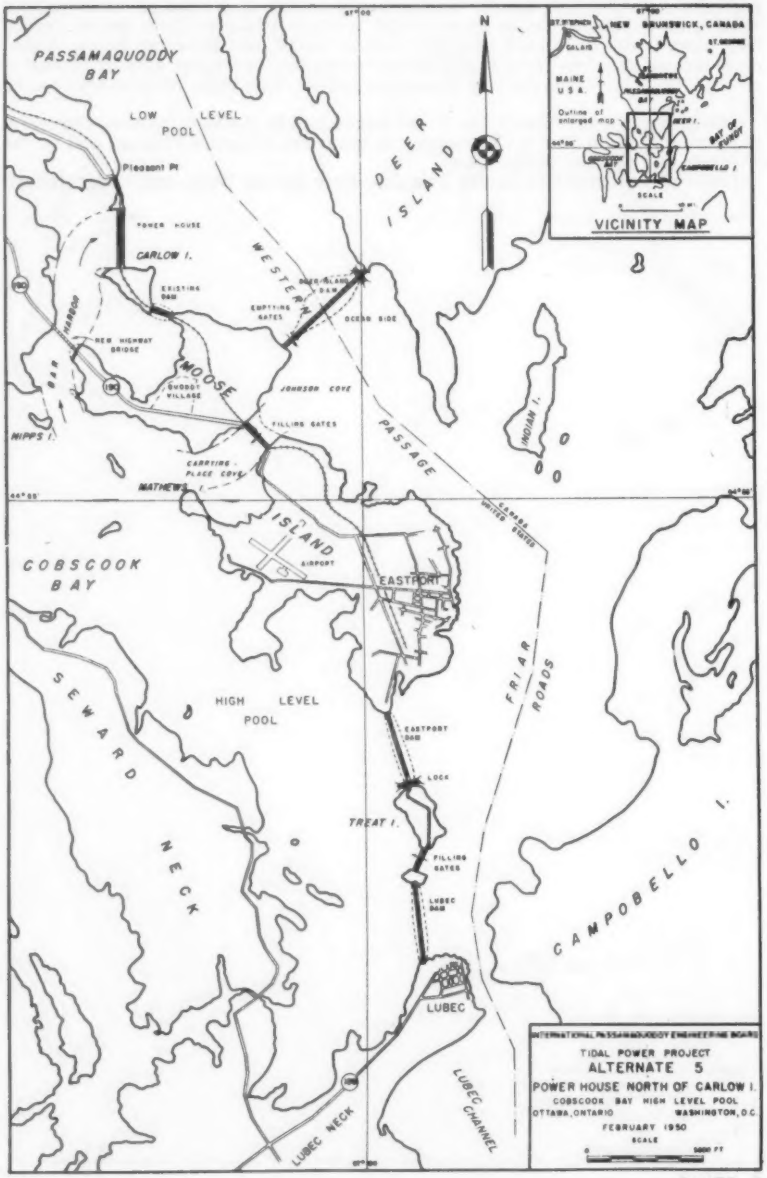

PASSAMAQUODDY BAY
LOW LEVEL POOL
Pleasant Pt
POWER HOUSE
CARLOW I.
EXISTING DAM
EMPTYING GATES
WESTERN
DEER ISLAND
DAM
OCEAN SIDE
THOROUGHFARE
NEW HIGHWAY BRIDGE
MOOSE
DUDDY VILLAGE
JOHNSON COVE
FILLING GATES
HIPPS I.
CARRYING PLACE COVE
MATHEWS I.
PASSAGE
INDIAN I.
ISLAND
AIRPORT
EASTPORT
COBSCOOK BAY
HIGH LEVEL POOL
SEWARD NECK
FRIAR ROADS
EASTPORT DAM
LOCK
TREAT I.
FILLING GATES
LUBEC DAM
LUBEC
CAMPOBELLO I.
LUBEC CHANNEL
LUBEC NECK
N
NEW BRUNSWICK, CANADA
MAINE U.S.A.
Outline of enlarged map
BAY OF FUNDY
VICINITY MAP
TIDAL POWER PROJECT
ALTERNATE 5
POWER HOUSE NORTH OF CARLOW I.
COBSCOOK BAY HIGH LEVEL POOL
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1950
SCALE

PLATE 5

LETITE PASSAGE AREA

This location plan illustrates that at least 3 alternate dam sites have to be investigated to determine the most economical sites for dams and filling-gate structures. No detail surveys and foundation investigations are available in this entire area, and extensive investigations will be required to locate the most economic alinement for the closure structure.

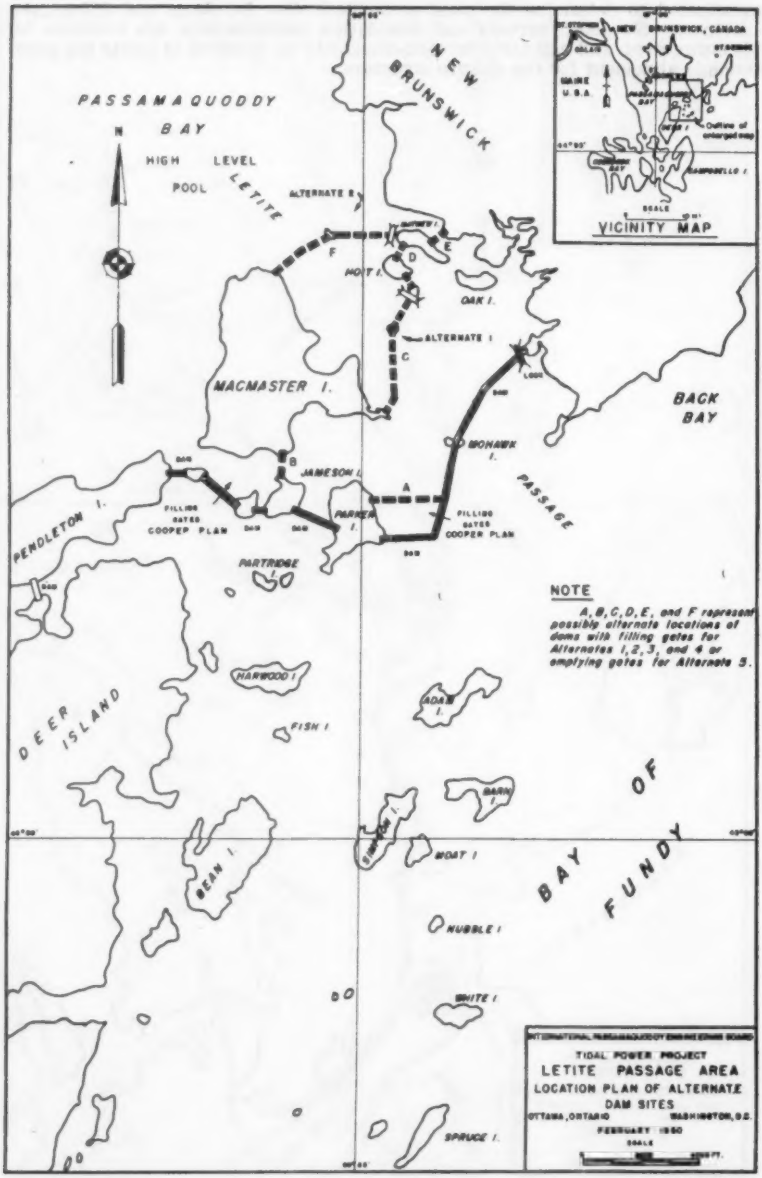

PASSAMAQUODDY BAY
HIGH LEVEL POOL
LETITE
ALTERNATE 2
NEW BRUNSWICK
MOIT I.
OAK I.
ALTERNATE 1
MACMASTER I.
BACK BAY
MOHAWK I.
JAMESON I.
PARKER I.
PASSAGE
PENDLETON I.
PARTRIDGE
HARWOOD I.
DEER ISLAND
FISH I.
BEAN I.
BOAT I.
NUBBLE I.
WHITE I.
SPRUCE I.
BAY OF FUNDY
FILLING GATES COOPER PLAN
VICINITY MAP
NOTE
A, B, C, D, E, and F represent possible alternate locations of dams with filling gates for Alternates 1, 2, 3, and 4 or emptying gates for Alternate 5.
TIDAL POWER PROJECT
LETITE PASSAGE AREA
LOCATION PLAN OF ALTERNATE DAM SITES
OTTAWA, ONTARIO
WASHINGTON, D.C.
FEBRUARY 1950

PLATE 6

Mr. McIntire. The Passamaquoddy project is designed to use the rise and fall of the tides in the Bay of Fundy for generating electricity. I have a map here showing the eastern portion of Maine, New Brunswick and Nova Scotia.

I would point out in relation to Senator Payne's testimony that the manganese deposits to which he refers are up in here [indicating] the sulfur deposits are in this area here [indicating], and there are rail facilities in these areas and, of course, all of this area along the coast of Maine, are potential plant sites with deep port opportunities.

Now the Bay of Fundy to which I refer is this area of water, here [indicating].

The site of the Passamaquoddy project is located at Eastport, Maine, which is here [indicating].

Directly to the north lies Deer Island, a Canadian possession; to the south is Seward Neck, a companion island, and to the east is Campobello Island, a favorite vacationing place of the late Franklin D. Roosevelt.

Farther to the north, and beyond Deer Island, is the Passamaquoddy Bay, a paramount factor in the suggested power project; directly to the south lies Cobscook Bay, whose waters wash the Eastport and Seward Neck shores and whose part in the suggested power project is also of great importance. And farther to the east the Bay of Fundy, the great body of water of which both Passamaquoddy and Cobscook Bays are a part, forms a broad ribbon of water that separates the coastline of Maine from that of Nova Scotia.

As we all know, tides are fluctuations of the ocean surface going through two complete cycles between high and low levels in slightly less than 25 hours, these tides being caused by attractive forces principally between the earth, moon, and sun. Tide ranges are different throughout the world, being very small in some countries and very large in others.

The greatest tidal ranges in the world occur at the head of the Bay of Fundy, of which Passamaquoddy Bay is an arm; here tide ranges of over 50 feet are experienced. Passamaquoddy tides at Eastport, Maine, range from about 13 feet at low tide to 26 feet at high tide, with an average of approximately 18 feet.

A close examination of the Quoddy area will reveal several outstanding physical features that contribute to the high tides of Quoddy Bay. One such feature is the northeasterly slanting nature of Maine's shoreline. Incoming tides strikes this shoreline and are deflected with great force; the resultant impact creates tides of great force and sweep.

Another such feature is the coarse nature of the ocean floor in the bay area. Tides playing in the bay are pushed along by many rough and unseen underwater fingers that lend them force and drive them along their way. Too, another such feature is that body of land called Nova Scotia. Lying to the east of the Maine coast where the forceful tides play, this body of land serves to function as a great gathering arm, reaching out and drawing the ocean's thrashing waters into its bay—in consideration of these physical features, then, it is not surprising that the tides of Quoddy are so dynamic in nature.

It is to be observed that both Passamaquoddy and Cobscook Bays

are within the tidal range of the Atlantic Ocean, splendidly lending themselves to a two-pool power project. The two-pool type of project permits of passing water continuously from an upper pool through a powerhouse to a lower pool. As the level of the ocean increases on a rising tide, the upper pool is replenished by admitting water through filling gates; and when the levels of the ocean and the upper pool coincide, shortly after the maximum ocean level is reached, the filling gates are closed so as to maintain the upper pool at the highest possible level.

As the ocean recedes on a falling tide, water which has accumulated in the lower pool is returned to the ocean through emptying gates. When the levels of the ocean and the lower pool coincide, shortly after the minimum ocean level is reached, the emptying gates are closed so as to maintain the lower pool at the lowest possible level. At and near low tide, auxiliary gates permit the powerhouse to discharge directly into the ocean rather than into the lower pool, thus conserving head, with resultant increase in prime power.

The international plans for Passamaquoddy considered in the report of May 1952, involve two-pool tidal power projects utilizing both Passamaquoddy and Cobscook Bays. These plans fall into two basically different groups, and in the first group the area of the Passamaquoddy Bay pool is 101 square miles and the area of the Cobscook Bay pool is 27 square miles.

The unfavorable ratio of pool areas of 3.8 is partially compensated for in some alternates by powerhouse arrangements permitting direct discharge to the ocean during the low part of each tide cycle. The second group utilizes the same two pools and increases the area of the smaller pool to 38 square miles by the inclusion of Friar Roads. In this group the ratio of pool areas is 2.7. The five principal alternate plans included in the report of the International Passamaquoddy Engineering Board, dated March 1950, are as follows:

ALTERNATE PLAN NO. 1

Passamaquoddy Bay is utilized as a high level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). Cobscook Bay is utilized as a low-level pool with closure dams between Eastport, Treat Island and Lubec. The powerhouse is located at Johnson Cove. The water area of Passamaquoddy Bay, high level pool, is 100.5 square miles and Cobscook Bay area, low-level pool, is 26.5 square miles. The ratio of pool areas is 3.8 to 1. The filling gates are located at Letite Passage and at the westerly end of Deer Island Dam. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates near the powerhouse permit turbine discharge direct to the ocean during approximately 5 hours of a tide cycle. During this time the reversible head gates located in the tailrace channel leading from the powerhouse into the low-level pool are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent, and the average net head at the powerhouse is correspondingly increased. Locks are provided at Letite Passage, Deer Island Dam and Treat Island.

ALTERNATE PLAN NO. 2

This alternate is similar to alternate 1, utilizing Passamaquoddy Bay as a high level pool with closure dams at Letite Passage and Western Passage. Cobscook Bay as low level pool will have closure dams between Eastport, Treat Island and Lubec. The powerhouse is, however, located at Carryingplace Cove. The water area of Passamaquoddy Bay, high level pool, is 100.5 square miles and Cobscook Bay, low level pool, is 26.5 square miles. The ratio of pool areas is 3.8 to 1.0. The filling gates are located at Letite Passage and between Johnson and Carryingplace Cove. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates near the powerhouse permit turbine discharge direct to the ocean. During this time the reversible head gates, located in the tailrace channel leading from the powerhouse into the low-level pool, are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent, the average net head at the powerhouse being correspondingly increased. Locks are provided at Letite Passage, Deer Island Dam and Treat Island.

ALTERNATE PLAN NO. 3

Passamaquoddy Bay is utilized as high-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). Cobscook Bay is utilized as low-level pool with closure dams between Eastport, Treat Island, and Lubec. The powerhouse is located between Moose and Mathews Islands. The existing Carlow Island and Pleasant Point Dams are removed and a long shallow dam is provided from the mainland near Nipps Island to Mathews Island to form an approach channel through Bar Harbor. The water area of Passamaquoddy, high-level pool, is 101.5 square miles. The ratio of pool areas is 4 to 1. The filling gates are located at Letite Passage and at the westerly end of Deer Island Dam. The emptying gates for Cobscook Bay are located at Treat Island. Additional emptying gates at Johnson Cove permit turbine discharge direct to the ocean during approximately 5 hours per tide cycle. During this time the reversible headgates, located in the tailrace channel leading from the powerhouse into the low-level pool, are closed. These additional control gates reduce the rise of Cobscook Bay by approximately 10 percent; the average net head at the powerhouse is correspondingly increased. Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

ALTERNATE PLAN NO. 4

Passamaquoddy Bay is utilized as high-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). Cobscook Bay and Friar Roads are utilized as low-level pool with closure dams between Campobello Island and Deer Island (Pope Island Dam) and between Lubec and Charley's Point (Lubec Channel Dam). The powerhouse is located at Bar Harbor, approximately one-half mile south of the highway bridge. The water area of Passamaquoddy Bay high-level pool, is 102.5 square miles and Cobscook Bay including Friar Roads low-level pool area is 37.5 square miles. The ratio of pool areas is 2.7 to 1. All filling gates are located at Letite Passage.

The emptying gates for Cobscook Bay and Friar Roads are located at Pope Island and Lubec Channel Dams. Locks are provided at Letite Passage, Lubec, Deer Island Dam, and Pope Island Dam.

ALTERNATE PLAN NO. 5

Cobscook Bay is utilized as high-level pool with closure dams between Eastport, Treat Island, and Lubec. Passamaquoddy Bay is utilized as low-level pool with closure dams at Letite Passage and Western Passage (Deer Island Dam). The powerhouse is located between Carlow Island and Pleasant Point. Cobscook Bay as high-level pool is 37.5 square miles and the water area of area is 2.5 to 1. The filling gates are located at Treat Island and in the neck between Carryingplace and Johnson Coves. The emptying gates are at Letite Passage and at the westerly end of Deer Island Dam. Locks are provided at Letite Passage, Deer Island Dam, and Treat Island.

I might say for your passing interest that the tides move in here so fast [indicating] that as they are forced up through here—and I would point out that the slant of the coast of Maine contributes to these high tides and Nova Scotia coming down this way, sort of serves as a gathering arm, and this coastline slanting northeast has a tendency to deflect the incoming tides up the coast, and Nova Scotia serving as a gathering arm forces these waters into the Bay of Fundy and of course forces them right up to the upper end of the bay and the tide moves in here, having to fall and rise so much in its cycle, it moves in so rapidly that as it moves up the Pedekodyak River in Nova Scotia, it develops a physical phenomenon there which occurs in no other place in the world, where there is a tidal bore, and it is developed by virtue of the tide moving up this river mouth and up the river so fast that the current of water coming down against the tide builds up a wave of water, the tide being the stronger, and this wave moves right up the river against the current of the river. I have seen it at Mungden, New Brunswick, running at about 3 feet in height. It varies in height, depending on the volume of water coming down the river and the volume of water currently, because tides do vary in height and it varies a little, of course.

I just mention that to show you what a great force is generated here in these tides and how they do establish very substantial high levels and low levels, which, of course, is the underlying principle of the Passamaquoddy project.

Now to refer to this plan which I have placed in the record, I want to direct your attention to the suggested plans. There are five, and they vary a bit in principle. This is a more detailed map of the area which is involved.

Here is the Bay of Fundy over here [indicating].

As the tides move up toward the Bay of Fundy, of course they are gathered in and move in between these islands.

Now the international boundary comes down through here [indicating]. This is Campobello Island, and Deer Island here [indicating]. As these tides move in they fill Passamaquoddy Bay, which is here.

The principle involved is to take advantage of the geography of this area and build dams at narrow places here, and develop a high pool and a low pool. The idea is that as the tide moves in, these dams will

form this high pool that gates open permitting the high pool to be filled. At high tide, the gates close, holding the water entrapped in this area which is approximately 100 square miles.

Then there are dams here [indicating] which surround Cobscook Bay, closing it off and as the tides comes in these dams are locked so that this area of Cobscook does not fill. When a high tide is held here, the water is put across through a powerhouse here, and emptied into the Cobscook Bay area, which is at low tide. As this tide is drawn down here, the lower pool area fills and as you go by the balance, the gates open here and empty the low pool and the high tide is replenishing the upper pool. That is the whole principle of the tidal project. There is a large area entrapped here, emptying that through a powerhouse into a lower tide area and just revolving that twice a day.

Mr. McIntire. Now the ratio of these pools is of engineering significance because this being a ratio of about 1 to 3, with the larger pool having about 3 times the capacity of the lower pool, you can very well understand that you would fill the lower pool more rapidly than it would have capacity to balance from the high pool.

And so when the levels of the pool reach nearly a balance you would have a low tide area down here as the tide is going out and provision is made in the prospectus that you would just have gates that would go directly into the turbines and empty right into the outside area.

Mr. Vorys. Is that a river up there?

Mr. McIntire. This is a tidal area here, Mr. Vorys, but the St. Croix River enters into it up here. The tidal area goes beyond the confines of this map.

Mr. Vorys. The St. Croix River would not affect this?

Mr. McIntire. No, it would contribute some water, but that is all. It is very small.

Now in order to facilitate shipping, there would be ship locks in here in order to service these areas up here [indicating].

This is St. Andrews, New Brunswick, which is a very noted summer vacation spot in the Maritime Provinces. Calais, Maine, is up here, and Eastport, Maine, is up here, and Lubec is here.

These dams would be put across at these points locking this up as a high-level pool. The dams put across here would lock this as a low-level pool. As your tide comes in you replenish the high pool, and as the tide goes out you empty the low pool.

In the cycle of tides you would lower this area about 4 feet so that you would always have a head of water behind your generators of somewhere around 15 to 19 feet all the time.

Now the underlying problem in the American project was that during the period when your tides were in balance, there was no head of water available and it necessitated pumps to pump water through the turbines to generate at that particular stretch of time, but this does away with the problem of that because you maintain a head of water constantly at not less than 15 to 19 feet, depending on the height of tides.

These other plans you can see are similar. This is a high pool and Cobscook Bay is a lower pool, but there is a different arrangement of the dam here and a different arrangement of the powerhouse.

Another suggested plan is about the same with a slightly different arrangement in here [indicating] and the same arrangement up at Letite Passage.

There is a fourth plan which changes the ratio of the pools a little bit and uses Friar's Passage, here, as a part of the low-pool area, which would increase the capacity of the lower pool area but it would not change the general potential of the project.

This would probably be more expensive.

Another plan is the reverse of the other four which would use the larger area as the lower pool and the smaller area as the high pool and as near as I could determine in reading this material that simply brings into balance the ratio of the pools a little better, but that is not of too great importance except that it is an engineering problem which would be developed, of course, in the survey.

Let me turn back to the original plan:

Some of the problems associated with this are engineering problems, as to where the dams would be located. In through here there is a partition of water where an earth- and rock-filled dam would go in. That is somewhere around 136 feet at mean low tide.

The currents are strong, of course, in through here, and there is an engineering question as to getting a dam established in there.

They have disclosed by virtue of the surveys which were reported in that report which I have put in the record that there is virtually no overlay of material, here. It is virtually bedrock through that channel, and of course it is bedrock because it has been swept clean all these years by the current being so strong in there. It is considered that that can be done with an earth- and rock-filled dam.

I just wanted to make some closing observations in my prepared statement, here.

Tidal power possesses certain distinct advantages over other sources of power, the water supply being thoroughly dependable and always definitely predictable.

Too, unaffected by droughts, floods, or ice jams, the Passamaquoddy tides now provide the most dependable and most permanent known source of power. It is reported that the theoretical power capacity of such a power project is approximately 20 billion kilowatt-hours, while the estimated actual production would, in all probability, be about 3 billion kilowatt-hours per year, or around 1 million horsepower.

The construction of a Passamaquoddy power project would facilitate the decentralization of industry. This is an important aspect, because our Federal Government has, since the advent of the atomic bomb, heartily endorsed a program of industrial decentralization.

The area of Quoddy, being expansive in natural and ideal for industrial plant development, affords the accommodation of a vast array of industrial units. It is evident, then, that such an area possesses great potential for making a supreme contribution to the overall planning for America's defense.

It may be stated with substantial correctness that the project area required for the Passamaquoddy tidal project belongs to the ocean. Maximum tide stages in the upper pool would be no greater than at present, so there would be no resultant damage to shorelands or improvements. Nor would there be any appreciable damage to lands or improvements bordering the lower pool.

In short, the Passamaquoddy area is the only such place in the world where a tidal-power project can be constructed without interfering with or destroying the economic importance of other capital assets such as land, industry, and homes; to the contrary, such a proj-

ect would encourage expansion of whatever capital assets now exist and would promote the creation of others.

Such a survey, it must be realized, would require considerable time. In its report of March 1950 the International Passamaquoddy Engineering Board reported that an investigation sufficiently broad to give consideration to all practical alternate plans, to develop the most economical plan, and to determine the economic feasibility of the best plan would require a period of about 18 months on the basis of commencing field work in the spring of any year, exclusive of the fisheries investigation.

The Deputy Minister of Fisheries, Canada, and the Fish and Wildlife Service, Department of the Interior, United States, have advised the Board that an investigation to determine the effect of a tidal project on the fisheries in the region would take about 3 years.

Construction, too, would extend over a substantial span of time, for the nature of the physical elements involved, although not unyielding, is fundamentally stubborn. According to the most reliable information available at this time, the construction of such a power project would require approximately 4 years.

The engineering feasibility of producing tidal electric power in the Passamaquoddy area is generally recognized and accepted. Too, from the viewpoint of the construction engineer, it is not believed that there would be any insuperable obstacles to the construction of such a project. In view of these considerations, it may be confidently assumed that the power potentially available in the Passamaquoddy tides will ultimately be developed. The event seems certain, the only uncertainty being the point of time. A survey as provided for in the joint resolutions now before this committee will determine whether or not that point of time is now.

It is pertinent to state that, if the survey in question reveals an economic soundness associated with Passamaquoddy, there is reason to believe that private utilities will be stimulated to vigorously explore all possible sources of funds for financing construction of the power project. Supplemental funds would not then be required, the burden of cost of construction falling on private funds rather than the Federal Government.

We of the Maine delegation wish to express our sincere appreciation for this opportunity to appear before this committee, and we respectfully urge this committee to give these resolutions prompt and favorable consideration.

Mr. Chairman, I would be very happy if the members of the committee have some questions which I might answer and help them perhaps comprehend the principles underlying this project.

The reason why this is perhaps the one place in the world where such a project could be developed.

You have already had pointed out to you the background, the economic importance of it, some of the ideas involved in the project; the fact that with the ship locks in here that no area, either on our side of the border or on the Canadian side, would be foreclosed for development, even for oceangoing ships.

I again want to express our appreciation and before you do adjourn, Mr. Chairman, I would appreciate the opportunity for our senior Member of our House delegation, Congressman Hale, and Congressman Nelson, to express their views relative to this project.

Mr. MERROW. We will be very happy to hear them.

You have emphasized, and I think it is important in this, that it differs from other hydroelectric power, in that the flow is continuous and there would be no interruption in the generation of power in this project.

Mr. MCINTIRE. That is true. That was a weakness of the American project you referred to, Mr. Vorys. The American project was confined to the development all on this side of the line and it had none of the potential of this area up here. It did require (because of the very limited storage capacity that could be developed in here), it did require periods twice a day in which you had to pump water through the turbines which, of course, was too expensive.

But this would eliminate all of that type of a problem.

Mr. MERROW. While you are right there with the map perhaps we should see if there are questions.

Mrs. Bolton.

Mrs. BOLTON. How can Canada use it? How will she prosper by it?

Mr. MCINTIRE. Let me turn this map down here, if I may. This is the location of the project [indicating], and the inhabited areas of project where much of their current business is transacted is all along this coastal area.

The heart of New Brunswick is wooded. The cleared farm areas of New Brunswick are right in here opposite my home county. There is some along the north shore and down through to Chinecto and then along the south shore of New Brunswick are the areas where the present business of New Brunswick is carried on.

Mrs. BOLTON. Do they have plans for working this area?

Mr. MCINTIRE. The reference that Senator Payne made to some of the mineral potential of New Brunswick which is more important than of passing interest, is in this area through here [indicating].

Mrs. BOLTON. Like the iron ore?

Mr. MCINTIRE. Lead and copper and some other quite interesting possibilities. It very logically would move toward the southern part of New Brunswick which would bring it within 100 miles of the Quoddy project.

Mrs. BOLTON. It is sufficient to bring Canada into the picture, financially? Will she contribute anything—not toward the survey, as I understand it?

Mr. MCINTIRE. I sincerely believe that if the survey shows a very definite economic possibility, that Canada will be very definitely interested.

Mrs. BOLTON. In the building?

Mr. MCINTIRE. In the building.

Mrs. BOLTON. Thank you very much.

Mr. MCINTIRE. I sincerely think so.

At the present time Canada is developing some hydroelectric power right in this area here [indicating]. It has a limited amount of hydroelectric power in that area.

Mrs. BOLTON. Thank you very much, Mr. Chairman.

Mr. MERROW. Mr. Battle——

Mr. BATTLE. Thank you very much, Mr. Chairman.

It is nice to have your testimony and to see you, Mr. McIntire.

I am wondering if we coud also interest Canada in paying for a part of the survey?

Mr. McINTIRE. I would not foreclose the possibility, but I would regret to see the possibility of this survey made contingent on Canada because I believe there is a possibility of her becoming interested in construction if it is economically feasible, but I would hope that we might not make the survey contingent upon that.

Mr. BATTLE. We have the St. Lawrence seaway project where Canada is ready and we are not ready.

Possibly if we could work from the start with Canada on this, it might be well.

Mr. McINTIRE. Those of you who have visited the Maritimes, I am sure would make the same observaiton that I do, that the present expansion of the economy of Canada is not being felt appreciably in the Maritimes. It is coming in the central part of Canada in Quebec and Central Ontario.

They have much the same problem as this area of Maine that the Senator referred to, needing the development of these industries. It is just as much on their side of the line as is true on ours. I think the demand that the Maritimes will make if this is found to be economic, will help materially in getting Canada to participate in the cost of the project.

Mr. BATTLE. Thank you, Mr. Chairman.

Mr. MERROW. Mr. LeCompte——

Mr. LECOMPTE. Thank you, Mr. Chairman and thank you, Mr. McIntire.

I really think of no questions at the moment.

Mr. MERROW. Mr. Hays——

Mr. HAYS. I have no questions. I would just like to thank Mr. McIntire for a fine statement.

Mr. MERROW. Mr. Vorys——

Mr. VORYS. This has been extremely interesting.

I see this 1 plan has 6 dams proposed. While I appreciate that the engineering survey has to be made before you can get any accurate estimates of cost, have you any idea how that would compare in number of cubic yards or something like that, with either the St. Lawrence, or TVA, or Grand Coulee projects, things with which we are somewhat familiar?

Mr. McINTIRE. No, frankly, I have not. I have never seen any figure on that, Mr. Vorys, at all.

I might express my thought relative to these resolutions which we have here for consideration this morning. It might be a suggestion that if this project is challenging, as I frankly believe it is, I am sure that we would be very happy to arrange for the committee a more comprehensive and detailed testimony from many aspects of this project, in order that much of the engineering could be outlined to the committee.

Mr. VORYS. Well, it seems to me—let us all face it frankly: Passamaquoddy has a bad name clear across the country as a sort of a fool's delight. What you have shown us this morning shows the great difference between the so-called American plan and the international plan, but it seems to me that one of the things that would not be hard to get would be the comparative amount of work to be done on, for instance, this plan No. 1, as compared with the St. Lawrence seaway plans, or the TVA plans, and so forth.

For instance, six dams are a lot fewer dams than are involved in TVA and a lot of other projects, but I appreciate that they are gigantic dams in length.

Mr. McINTIRE. Not as much as you might expect, Mr. Vorys. This is not a great distance across here.

Mr. VORYS. How far?

Mr. McINTIRE. I would say that it is probably a mile and a quarter. It may be nearer 10,000 feet across there, I do not know. According to the scale it would be between 7,000 or 8,000 feet across there.

Mr. VORYS. From my little experience, that is not a gigantic dam.

Mr. McINTIRE. No, and you see that would be about the longest one across there.

That is one of the questions, however, because of the strength of the tides through that neck.

Mr. VORYS. Of course.

Mr. McINTIRE. No, these dams are not long dams as they are known in many of the power projects, at all.

Mr. VORYS. Thank you very much.

Mr. MERROW. Mr. Prouty——

Mr. PROUTY. These are earth dams?

Mr. McINTIRE. I would expect so, yes, from all I know. And these would provide a highway from the city of Eastport to Lubec. There would be a highway across those dams because they go from island to island.

Mr. PROUTY. That would reduce the cost of construction considerably, then?

Mr. McINTIRE. And the project, as it was worked there back in the thirties, built dams right in here which are still there.

Mr. BATTLE. These could not be earth dams, could they? Would you not have to have spillways and so forth?

Mr. McINTIRE. There would have to be some construction in there, yes, but—no, there would be no spillways here as such, Mr. Battle, because your water is all coming through your powerhouse. It is not a case of having to take care of an accumulation of water because you have the supply of water constantly under control, here. It is not like a river in which you have to provide for spillways.

Mr. BATTLE. Then when your lower section does not quite take care of the overflow, it would go right through the powerhouse; is that right?

Mr. MERROW. In your considered opinion, since there have been 2 or 3 estimates of the cost of the survey, do you feel that the authorization should be $3 million as provided in these bills, and if it is not necessary to use it all, leave it there?

Mr. McINTIRE. I would recommend that so that we would have at least the outer latitude in which to work.

Mr. MERROW. Are there any other questions?

Mr. Hale will proceed next.

STATEMENT OF HON. ROBERT HALE, A REPRESENTATIVE IN CONGRESS FROM THE FIRST DISTRICT OF THE STATE OF MAINE

Mr. HALE. Mr. Chairman, Madam, and gentlemen of the committee, I first want to express my gratitude for giving us this hearing. I think that in all the period I have been here in Congress it is the best day in court that we have ever had on the Quoddy project and

almost the only day before a committee of the Congress except with respect to the appropriations bills when we got a small amount of money, $30,000, to be exact, a few years ago, for determining the cost of determining the cost.

The field has been so admirably covered by the two Senators and by the Representative from the districts involved, that there is not very much I can add but I should like to emphasize a few points.

In the first place, if I may be permitted a word of personal reminiscence, I was in the Maine Legislature in 1927. At that time I first met Dexter P. Cooper who lived on Campobello Island the year round and was at least a summer neighbor of Franklin D. Roosevelt, who also lived there.

Franklin D. Roosevelt was at that time regarded as quite a promising young politician.

I remember very well the discussions we had in the legislature about the Quoddy project and the hours that I spent with Mr. Cooper who was not only a very attractive man but a very intelligent man. His concept of this project was profoundly interesting. It was a magnificent project and nobody in all the years since that time has ever again said the correctness of the concept from a purely engineering point of view.

I was very pleased that Mr. Vorys a moment ago was as frank as he was, because I do think it is true that the Quoddy project has gotten a black eye. I think as Senator Smith said that was partly very largely because of the unsuccessful flirtation with the American plan back in the 1930's, plus the episode of the youth administration, and so on.

Quoddy has never yet really had its chance.

I remember making a speech in the State legislature on the bill which incorporated Dexter P. Cooper. The legislature passed the legislation unanimously, if I remember correctly, and upon the subsequent referendum to the people of Maine, the incorporation was approved with an insignificant dissent.

I should like to emphasize that the law to which reference has been made prohibits the export from Maine of power generated wholly within the State of Maine.

This power would not be generated wholly within the State of Maine so that the law would not apply in any view of it. That disposes of that and, of course, any power generated at Quoddy would certainly be exported—if you could call it exported—it would go into the province of New Brunswick and would certainly go to Nova Scotia and possibly Quebec.

Also I would emphasize the fact that there is no private public-utility company now operating in the State of Maine—certainly none of the major companies in my opinion—who wouldn't buy power from Quoddy if it could be marketed cheaply enough. The great thing about Quoddy that I should emphasize is that you get this even flow 365 days a year.

There is another point about Quoddy that always impressed me because I used to be a lawyer, and I used to represent public utility companies, and one of the great things that used to occupy my time were claims of people up the river who were flowed out. Anybody who has had anything to do with hydroelectric power on a river has settled these flowage claims.

There is absolutely none of that. There is none of the element of land damage, and there is no destruction of the landscape, no destruction of towns, and so on, as very frequently happens in these large hydroelectric projects. It always happens, in fact. I might cite the Hoover Dam and the project in South Dakota that we were debating only the other day.

The nearest point in my district to Quoddy, I suppose is 250 miles away, so that my interest in the project is less than that of our colleagues who have spoken, but I am certain there is no part of Maine which wouldn't feel the very great stimulus of this project if it could be economically developed.

What Senator Payne has said about the mining industry, and so on, that would affect the whole State. As I have already said, the private utility companies would certainly purchase the power, so that every nook and corner of the State would derive a tremendous economic benefit from this power if it can be produced as cheaply as we hope.

On the other hand, if the cost of development does, upon examination, prove to be prohibitive, then the sooner we know it, the sooner the whole discussion of Quoddy is set at rest.

I made a note about hardwoods. Someone preceding me mentioned the fact that the Great Northern Paper Co. was using hardwood for the production of newsprint. The S. D. Warren Co. in the district which I represent is also using hardwood in the production of book papers.

It is difficult to exaggerate the significance of this enormous supply of power if it is really generated and spread around.

Not only in the State of Maine, but under modern methods of transmission, I assume it would go into your State, Mr. Chairman, and possibly other New England States, so that I do very earnestly hope that the committee will vote to give passage to these resolutions.

Mr. MERROW. You would say if the committee does vote favorably then the survey will be conducted and the question will be settled one way or the other.

Mr. HALE. For all time.

Mr. MERROW. Mrs. Bolton——

Mrs. BOLTON. Again, I go back to the hardwoods and the paper companies.

Do you find in your areas that they have a conscience about conservation and that they are replanting, and on what basis of time, because the hardwood grows so much more slowly than softwood?

Mr. HALE. I suppose conscience varies with different people in different localities.

Mrs. BOLTON. You have not seen any great evidence of such conscience?

Mr. HALE. I feel there may be people that may be without conscience, but I would say that I have been told, and, as far as my personal observation goes, I would think it was true, that there are as many trees growing in Maine today as there ever have been, at least in my lifetime. Certainly, if you go through the State you do not see vast, denuded areas except where we had those very ruinous and terrible fires.

I think we have an organization dealing with fires which is better than we did have.

Mr. MERROW. Mr. Battle.

Mr. BATTLE. Thank you, Mr. Chairman. I have no questions.

Mr. HALE. I may say I think as far as conservation is concerned, there is more danger from the small, irresponsible landowners than from the great corporations which know the value of the land they have and they know what would happen to them if the trees were destroyed.

Mrs. BOLTON. Thank you, Mr. Chairman.

Mr. BATTLE. Thank you, Mr. Chairman. I have no questions, but I would like to say I appreciate the gentleman's testimony.

Mr. MERROW. Mr. LeCompte.

Mr. LECOMPTE. Thank you. I have no questions.

Mr. MERROW. Mr. Hays.

Mr. HAYS. I was glad to get your views on this.

To what extent can we use the material that was gathered in these earlier studies? The appropriations were made back there for some surveys. Is that of any value?

Mr. HALE. Certainly the survey that we have made through the International Joint Commission, for which an appropriation of $30,000 was obtained, it was as a result of their efforts that we were able to get this figure of $3 million, as I say, as the cost.

Mr. HAYS. This would pick up where that left off.

Mr. HALE. This picks up where that left off.

Mr. HAYS. Did they recommend the figure of $3 million?

Mr. HALE. They recommended $3.9 million, and that has been reduced by $900,000 as a result of the fact that there have been improved methods of getting data through electronic soundings.

Mr. HAYS. Thank you very much. That is all, Mr. Chairman.

Mr. MCINTIRE. Mr. Chairman, I might add there that the engineering work done in relation to the American project is not lost in relation to the survey work for the international project because there is much of the same area of soundings and borings that would be in this same location in the international projects. The dams which they constructed which are still in place, the short dams between some islands that are still in place are also a part of the international project so they too are not lost. Much of those surveys are still a part of the background material for establishing the economic feasibility of this.

Mr. BATTLE. Will the gentleman yield?

Mr. HAYS. I yield.

Mr. BATTLE. Is there any estimated time it would take to make this survey?

Mr. MCINTIRE. The engineering part, perhaps about 18 months, but the study of the impact on the fishing industries might take about 3 years.

Mr. MERROW. Mr. Vorys.

Mr. VORYS. Maybe this has been explained before, but I note in section 2 of these bills that a survey must be consistent with the prior survey and the supplemental report. We have been talking here about using the prior work. I don't quite get the significance of saying that a future survey shall be consistent with a prior report. Not knowing what was in the prior report, it would look to me as if that was an attempt to limit a future survey by a past survey.

Mr. McINTIRE. Well, that word, Mr. Vorys, is intended to direct the objective of the survey to be in line with the recommendations made in March of 1950 and May of 1952, because that is the survey upon which the dollars and cents estimate was made.

Now, the thought in the use of that word was that here were preliminary surveys that formed the basis of this request. It is not certainly the thought in using that word that that circumscribed the survey, other than the fact that the request is established on the basis of a report.

Mr. HALE. I am not sure whether the word "consistent" is as good a word as could be used. I would say it means "shall be based upon the report."

Mr. VORYS. Why wouldn't you simply say, "shall make use of the report."

Mr. McINTIRE. That is all right.

Mr. VORYS. Certainly if you are trying to get an impartial survey you want them to make use of what has been done before in order to save money and to be sensible about it, but I would not think that we would want to say that the findings would have to be consistent with anything that had ever been said about this before.

If the findings are going to be consistent with the general opinion on this, why we do not need to have a survey because the general, uninformed public opinion is that this is no good and you do not need to spend a dime in finding out how no good it is. I mean people who don't know much about it, like myself.

Mr. MERROW. Senator Smith, did you want to say something on that?

Senator SMITH. I would be glad to, but I would like for Mr. Nelson to get his time in.

Then I would like to come back and refer to my statement, Mr. Vorys, because I think that would clear up some of your questions.

Mr. PROUTY. I have no questions, Mr. Chairman.

Mr. MERROW. Mr. Nelson.

STATEMENT OF HON. CHARLES P. NELSON, A REPRESENTATIVE IN CONGRESS FROM THE SECOND DISTRICT OF THE STATE OF MAINE

Mr. NELSON. I would just like express my deep appreciation for the fine attention and great consideration this committee has given us. I think it has been absolutely wonderful. It certainly has been an encourament I know to every member of the Maine delegation.

Now, Mr. Chairman, there is little that a man who is on the bottom of the totem pole can say, after those who have lived so completely and enthusiastically with this problem for years have already testified.

There is one thing that I would like to point up: We are asking you here today not to build Quoddy. We are just asking you if you think the facts justify the appropriation of $3 million for an investigation of what could be a prime source of power for the United States.

I think on the facts that have been presented to you, that perhaps you could reach that conclusion.

Now, the second point that I want to make in order to be brief is that we here in the United States are looking for critical metals wherever we can find them. I would like to point out to you that we are

completely dependent for our supply of manganese upon waterborne shipments. In modern war such shipments are extremely vulnerable. If a total war occurred all of a sudden, we would need manganese and we would need this power, and we would need it quickly, and very quickly.

Some people are interested in the St. Lawrence seaway because iron ore has been discovered in Labrador and we know that the Mesabi Range in Minnesota has perhaps only 20 years to run, and then the United States will be looking around for other sources of iron. You have one here in Maine.

If we do not find it and if we do not find the manganese, the United States is going to be completely dependent on foreign countries for its shipments of critical materials and before long we will be paying buyers' prices for everything we get. That means our chances for internal bankruptcy increase.

I would like to say to you that we would like you to consider and consider seriously the importance of the survey costing $3 million to determine what the ultimate cost of Quoddy will be. After we have determined that, I am sure the problem will take care of itself. Perhaps the cost will be prohibitive. Then it is out. Maybe on the other hand, as the private power interests in Maine have already indicated to me, the private power industries would be completely interested in building Quoddy and financing it themselves.

Now, in conclusion I would like to say to you just as a humorous aside, there is another reason why the Maine delegation is concerned about Quoddy, because we are getting sick and tired of having it used as a political football every 2 years.

I want to thank this committee, as I say, for its very fine attention. I think it has been a grand hearing and we appreciate it no end.

Mr. MERROW. Mrs. Bolton——

Mrs. BOLTON. I merely want to thank the gentleman for his prompt recognition of the time element in all our lives, and his very clear and forceful presentation of two of the main, basic reasons for this survey, and to tell all of the Maine delegation that it has been a great pleasure to this subcommittee to have you appear before us. We particularly appreciate the nice little puff you gave us about the seriousness with which we have considered it.

We try to do that with everything that comes before us, we feel that is our duty, as Members of the Congress. But it is our pleasure particularly when we have such a delightful group and also the feeling in many of our hearts that Maine shall continue to be a very constructive State and contribute as she always has done to the general welfare of the United States.

Mr. NELSON. Thank you very much.

Mr. MERROW. Mr. LeCompte——

Mr. LECOMPTE. I merely want to endorse all of Mrs. Bolton's statements.

Thank you.

Mr. NELSON. Thank you.

Mr. MERROW. Mr. Vorys——

Mr. VORYS. As you notice, we all appreciate the enthusiasm and the brevity of your splendid presentation.

Mr. MERROW. Mr. Prouty——

Mr. PROUTY. I can say "amen" to what already has been said.

Mrs. BOLTON. May I add we appreciate very definitely the details that have been given us by the earlier two witnesses.

Mr. MERROW. Senator Smith, I believe, had something she wanted to say.

FURTHER STATEMENT OF HON. MARGARET CHASE SMITH, A UNITED STATES SENATOR FROM THE STATE OF MAINE

Senator SMITH. I wanted to try to answer one of Congressman Vorys' questions. There was what we called a preliminary survey. That is when Canada came in quickly and said, "Here's your $30,000. Go ahead, if you can raise the $30,000 down there."

It was our proposal, of course.

Mr. VORYS. That is the International Passamaquoddy Engineering Board.

Senator SMITH. That is right.

This request for the survey, what we consider to be the final survey, that is what that came out of. That is why the word "consistent" was used.

I would personally hope you would change those words and use your suggestion, "make use of."

The proposal was originally on an international basis, and then went to the State or to the American basis. As I stated before, it was out of the National Youth Administration connection that the socialism label was erroneously attached.

The Massachusetts firm who gave us a figure of $1.5 million did so with the thought that they could use some of the engineering data that had been accumulated through the years, as Congressman McIntire said. But the word "consistent" was meant as attaching it to that preliminary survey, which has recently been completed.

Does that answer your question?

Mr. VORYS. I have one further question which may have been covered. What was the substance of the report dated March 15, made by this International Passamaquoddy Engineering Board?

Senator SMITH. That report stated that it was physically feasible and that they were recommending that this final survey be made to make the final determination, and I would say again—I neglected to say that you asked about comparative figures. I am quite sure that those will come from the Army engineers, if and when they do appear.

Mr. VORYS. Appear on this bill?

Senator SMITH. Appear on this resolution. I would hope the Army engineers would appear.

Mr. VORYS. Were there any such preliminary figures given in the March 15, 1950, report?

Senator SMITH. No comparative figures in that, no, but the Chief of Army Engineers can give you that.

Senator Payne has just passed me this report, excerpts from it. In March 1950, the Board reported back to the Commission:

> It was the Board's opinion that an international Passamaquoddy project could be physically engineered, constructed and operated; that determination of its economic feasibility must await a full-scale survey; that such a survey would cost an estimated $3.9 million, the cost to be apportioned equitably between the two countries.

I made the suggestion about the $30,000 contribution by Canada to show that Canada was interested sufficiently to follow through with the money.

Mr. MERROW. Is it your recommendation, Senator Smith, that we should hear the Army engineers and the representatives of the firm who said that it could be done at a lower figure?

Senator SMITH. It would seem to me that that would be well to have before any action was taken in the House and Senate. Whether you do it or whether the Senate committee does it is the question, but I think it would be very worthwhile and quite necessary for a full understanding of it.

Mr. VORYS. One other question I had was, What is the composition of this International Joint Commission? Is it enough of a going concern that it could direct and manage such a survey?

Senator SMITH. There were 3 Americans and 3 Canadians who made up that Commission.

Mr. VORYS. How often did they meet?

Senator SMITH. They were set up for that—do you mean the International Joint Commission, or do you mean the special commission?

Mr. VORYS. Well, this bill, as I get it, proposes to have the International Joint Commission created in 1909 to carry on this survey.

Senator SMITH. Well, the American section of the International Joint Commission is headed by former Senator Stanley, who is Chairman and has been for a good many years. He was a former Senator from Kentucky, as I remember, and Senator Stanley's Commission, or the International Joint Commission, meets at regular times on all of the international projects. They recently were up in Canada on some other international proposals.

Mr. VORYS. It is the judgment obviously of the Maine delegation, that that would be appropriate authority, or executive, to carry on this survey?

Senator SMITH. That is right. That would be their function. They would have a full understanding and could complete the files on the past activities.

Mrs. BOLTON. Would the gentlemen yield?

Mr. VORYS. I yield.

Mrs. BOLTON. Is that the Commission that works on all the waterways, water tables, and so forth, which affect the Great Lakes as well?

Senator SMITH. That is correct.

I would like to leave this with the committee, that this is not on the actual construction but rather on whether or not such a project would be economically feasible and of value for national security.

I would like at this time, Mr. Chairman, to thank you and the members of your committee for being so patient and indicating such fine interest in this hearing.

I agree with the rest of the members of the delegation, this has been one of the most constructive hearings that I have attended in the number of years that I have been here.

I would like to add a second to the motion that the committee be invited up to look over the Passamaquoddy area.

Mr. MERROW. Thank you, Senator Smith, for your kind words. We are very happy to have the entire Maine delgation with us this morning.

I know that I voice the sentiment of all when I say that we appreciate the splendid manner in which you have presented this problem. We congratulate you and compliment you upon the very clear statements that have been made, and we feel that you have made a splendid presentation. We are certainly happy to have you with us.

Mr. MCINTIRE. Mr. Chairman, may I present this supplemental statement for the record?

Mr. MERROW. You may.

Mr. MCINTIRE. Passamaquoddy: Men of science the world over have long been intrigued by the prospect of harnessing the ocean tides and making them work for man. Dexter P. Cooper, an American and a famed hydroelectric engineer, was one of those whose imagination was captured by this prospect of harnessed tides. Living in Eastport, Maine, he became fascinated by the power potential of the mighty flow of the tides that play between the Passamaquoddy Bay region and the Canadian Province of New Brunswick. The Bay's pounding waves stimulated the mind of Dexter P. Cooper and prompted the first conception of a Passamaquoddy tidal power project. And as the tides swept along their briny course, he devised the first plans for the locks and dams that would harness the tides and use their force for producing cheap and ample electric power.

The Passamaquoddy tides intrigued others besides Dexter P. Cooper. One of these was the late President Roosevelt who summered on Campobello Island, an island whose shores are washed by the waters of the Bay of Fundy, of which Passamaquoddy Bay is a part. He, too, became captivated by the prospect of a project that would provide New England and New Brunswick with a never-failing source of cheap electric power. Spurred on by the tremendous possibilities inherent in the project, he vigorously petitioned the Canadian Government to join hands with the United States in an international project. Canada, for a variety of reasons, declined the invitation to participate in such a project, but the driving force of Quoddy continued and eventually found expression in an all-American project: this project was devised to encourage Canadian interest and designed to blend into a larger international project.

The Army engineers, utilizing funds made available to the War Department, began work on the all-American project in 1935. The engineers continued operations through 1936 and discontinued their activities only when Congress failed to appropriate funds needed to continue the work.

Then work on Quoddy hung in suspension for 12 years, but in November of 1948 the United States and Canada assigned to the International Joint Commission the responsibility for a preliminary investigation to determine the practicality, desirability, and costs of a full-scale survey of various plans for hydroelectric power development in Passamaquoddy Bay. The Commission appointed an International Passamaquoddy Engineering Board, and less than 2 years later, on March 15, 1950, this Board submitted to the Commission a report embodying multiple findings. The most important of the Engineering Board's findings, however, was that a Passamaquoddy tidal power project could be physically engineered, constructed, and

operated; the Board concluded, however, that a full-scale survey would be required to determine the economic feasibility of such a project. At that time the Board determined that the cost of such a survey would be $3,900,000, but the United States Army Corps of Engineers indicated in a later report, dated May 1952, that, in consideration of improved testing devices, such a survey would cost $3 million.

Quoddy, by its very nature, is truly a maritime phenomenon; the thundering waters of the Bay of Fundy, a bay of which Quoddy is a part, has tides of such sweep and force that they are unsurpassed the world over; only in the Orient are they equaled. Because the tides of Quoddy, itself, average 19 feet between flood and low water, there is a just base for unrestrained enthusiasm and a broad degree of optimism relative to the power potential of a Quoddy power project. The theoretical capacity of such a project would be approximately 20 billion kilowatt-hours, while the estimated actual production would, in all probability, be about 3 billion kilowatt-hours per year, or around 1 million horsepower.

A Quoddy power project would prove of great importance to the economies of Maine, all of New England, and the Maritime Provinces. As a source of power the project would be as sure as the very tides which prompted its being, affording industrial users an unfailing power supply; too, because the tides are always prevailing, the project would be spared those adverse effects many times associated with inland drought. Much of the industrial growth of this country can be attributed to ample supplies of electric power. Where there were powersites, there developed industries; where there were industries, there developed communities; and where there were communities, there developed our country. It seems reasonable to deduce that a similar pattern of growth and development would be associated with a power project such as Quoddy, redounding to the benefit of the area concerned and the country as a whole.

Maine's excellent port facilities offer an ideal avenue for handling those raw materials and finished commodities that would be associated with a power project such as Quoddy and those industries dependent on Quoddy. Industries using Maine's ports would enjoy those advantages peculiar to deep-water facilities that are ideally located with regard to world markets.

Cheap water-borne transportation and adequate sites for docking and repairs would also be available to these industries. Terrain features that splendidly lend themselves to defense against submarine and air-borne attack would make the 100-square-mile area a veritable haven for the ships of both our Navy and our merchant marine. In and out of these ports would smoothly flow those goods essential to this country's well-being in times of peace and periods of emergency.

It is of interest to further note that the construction of such a power project would not interfere with nor destroy the economic importance of those capital assets such as land, industry, or homes that now exist in the Quoddy area. To the contrary, such a project would encourage the expansion of whatever capital assets now exist and the creation of others.

Should Quoddy be constructed or should it be discarded as something which, although technically feasible, is economically impractical? Only a survey designed to measure economic feasibility can

supply the answer to Quoddy, and, in recognition of this, the Maine delegation has introduced to the Congress bills for the accomplishment of this purpose.

These bills grant the International Joint Commission authority to make a survey to determine the cost of construction of a Passamaquoddy tidal power project. Such a determination of cost would dissipate any confusion regarding project costs, bringing cost consideration out of the shadows of speculation and into the light of established fact. The actual project costs having been accurately appraised, it would then, by weighing the project's assets against these costs, be possible to effect a practical appraisal of Quoddy's merits.

The Maine delegation's bills are also designed to determine whether or not the costs of construction would allow hydroelectric power to be produced at a price that is economically feasible. The question as to whether or not such power can be economically produced has, for long, been uppermost in the minds of many persons interested in Quoddy. An evaluation of prevailing and potential markets for power distribution would reflect the degree to which power production would be utilized.

If a Quoddy power project proved economically feasible, it would be one of the relatively few places in North America where vast amounts of inexpensive electric power would be available to industry. It would be interesting at this point to examine some of the industries that would avail themselves of Quoddy's benefits.

The ever-expanding pulp and paper industry, utilizing the tremendous pulpwood reserves of Maine and nearby Canada, would thrive on such a rich source of power.

Fertilizer industries, finding a ready source of power and water, would find it advantageous to transfer essential raw materials to the power site and convert them into finished fertilizer products.

Steel mills, employing the latest electric furnace processes, would find such a location ideal, for they would have not only an ample supply of power but also ready access to the iron-ore deposits recently discovered in Labrador and the rich limestone deposits of Maine and New Brunswick. Aluminum and magnesium plants would also find it convenient and profitable to use the facilities of Quoddy and draw on the multitude of raw materials in the area.

Manganese processors, with an effective method for processing manganese ores, would find this area a veritable promised land for operations; it is now a matter of record that northern Maine's stubborn terrain holds in its grip quantities of manganese ore that defy accurate appraisal. Electric power generated in Quoddy might well prove the key to open the door to this vast treasure of virgin mineral resources.

And, in the event of an emergency, realizing that today the principal supplies of high-grade manganese ore are imported over water routes from South America, Africa, and India, the presence of convenient manganese deposits in company with a source of abundant power would prove a vital contribution to our national defense.

It is interesting to note that recently American and Canadian interests have merged to form the Fundy Bay Copper Co. for the purpose of developing the deposits of zinc, copper, lead, manganese, uranium, and silver that are to be found in eastern Maine. As newer methods

for recovery, processing, and refining spring into being, more and more attention is being focused on hitherto untapped mineral treasures.

It is to be recognized that a reliable source of power would be absolutely essential to the development of such mineral resources, and there is every reason to believe that a power project such as Quoddy would squarely meet all requirements.

The bills introduced by Maine's delegation in the Congress directs the International Joint Commission to determine what bona fide contribution such a project would make to the national economy and the national defense. The historically high consumption of high-grade fuels has left them relatively scarce and dear, and all the while the need for electric power keeps increasing by leaps and bounds.

An emergency would create a still greater demand for electric power and goods produced by that power; it is little wonder that increased attention is being focussed on the tides as a possible source of water; it is little wonder, too, that, along with others vitally interested in our national defense, the Maine delegation would like to resolve the question of power as it relates to the big tides of Quoddy.

Although Canada has, in the past, indicated only passive interest in the suggested Quoddy survey, two members of the Canadian Parliament, D. A. Riley, and A. J. Brooks, have reecntly experienced a surge of enthusiasm with regard to the project. According to a recent news release, Mr. Brooks, in the House of Commons on March 12, 1953, urged the House "to join with the United States in investigating the feasibility of developing power from the tides of Quoddy Bay on the New Brunswick-Maine border."

He further cautioned the Canadian Government against entertaining an indifferent attitude toward this splendid project aimed at harnessing the 40-foot rise and fall of the Atlantic tides. Mr. Brooks indicated that New Brunswick needs more power, particularly in association with New Brunswick's currently developing base-metals industry; such a source of power would, it is pointed out, dispense with the necessity of shipping Brunswick's ores out to other shores for processing.

It is the considered opinion of the Maine delegation that the question as to whether or not a Quoddy project is economically feasible should be resolved and that a survey designed to resolve this question has merit; only a survey such as this will reveal whether the tides of Quoddy Bay are to thunder on unharnessed or whether they are destined to serve the higher purpose of an America hungry for a present and future supply of hydroelectric power.

The Maine delegation has introduced to the Congress the following bills: Senate Joint Resolution 12; House Joint Resolution 112; H. R. 113; House Joint Resolution 114. These bills have been referred to the Foreign Relations and Foreign Affairs of the Senate and the House of Representatives, respectively—the Maine delegation is of the conviction that these bills warrant early and favorable consideration.

May I express the appreciation of the delegation for presenting this matter to you.

Mr. MERROW. If there is nothing more, the committee stands adjourned.

(Whereupon, at 12:15 p. m., the subcommittee adjourned to reconvene at the call of the Chair.)

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SURVEY OF PASSAMAQUODDY TIDAL POWER PROJECT

WEDNESDAY, JULY 22, 1953

HOUSE OF REPRESENTATIVES,
COMMITTEE ON FOREIGN AFFAIRS,
SUBCOMMITTEE ON HOUSE JOINT RESOLUTIONS 112, 113, AND 114,
Washington, D. C.

The subcommittee reconvened pursuant to call at 10:20 a. m., room G–3, United States Capitol, Hon. Chester E. Merrow (chairman of the subcommittee), presiding.

Mr. MERROW. The committee will be in order.

This is a meeting of the Subcommittee on International Organizations and Movements acting as an ad hoc subcommittee to continue hearings on House Joint Resolution 112 introduced by Mr. McIntire, of Maine; House Joint Resolution 113, introduced by Mr. Nelson, of Maine; and House Joint Resolution 114 by Mr. Hale, of Maine.

These resolutions would authorize and direct the International Joint Commission on United States-Canadian Boundary Waters to make a survey of the proposed Passamaquoddy tidal power project.

Similar resolutions have been introduced in the Senate. Senate Joint Resolution No. 12, by Senator Smith. Senator Payne introduced a similar resolution.

At the hearing which we had last week, it was suggested by Senator Smith that the committee ought to hear the engineers on this project, both the Corps of Engineers and representatives of a private firm who have made an estimate of how much it would cost to make the survey.

The meeting this morning is for that purpose.

We have with us Mr. McIntire, of Maine, and Senator Smith.

I recognize Mr. McIntire, who will proceed as he wishes.

STATEMENT OF CLIFFORD G. McINTIRE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MAINE

Mr. MCINTIRE. Thank you, Mr. Chairman.

I am sure the Maine congressional delegation certainly appreciates your continuing the hearing in order to get additional testimony relative to the merits of the bills submitted by my colleagues and me.

I want to say that Mr. Nelson and Mr. Hale will endeavor to be here in the course of the hearings, but having other committee hearings this morning will be delayed, if at all able to be with us. However, they continue their interest in the work of this subcommittee relative to these bills.

I would like to call first upon the senior Senator from Maine, Senator Margaret Chase Smith, who has additional material which she would like to present to the committee. Senator Smith.

Mr. MERROW. Senator Smith, we would be glad to have you come up to the head of the table.

STATEMENT OF HON. MARGARET CHASE SMITH, A UNITED STATES SENATOR FROM THE STATE OF MAINE

Senator SMITH. Mr. Chairman, I want to again express appreciation for what you have done about these hearings and what you have continued to do and want to say that the hearing the other day was about as fine a hearing as I have been privileged to participate in, not only from the standpoint of my interest in Passamaquoddy, but my interest in legislative hearings.

Mr. MERROW. You made a fine presentation, and we enjoyed it.

Senator SMITH. Thank you.

You said something about the position of Canada. I have some material which I think you might want to have in the hearings. I have the official expressions of the Government of Canada. In addition, I have the personal expression of the Minister of Trade and Commerce, C. D. Howe, who has principal jurisdiction of this matter in Canada, and I will be glad, rather than take the time to read the entire material, to read excerpts from these latest expressions of the Canadian Government, and give you the balance for the record.

I have here the official expression from Canada dated March 11, 1953, at Ottawa:

> In view of the foregoing, various schemes for the development of tidal power in the Passamaquoddy-Cobscook area do not appear to be practical at this stage at least. Further surveys would not seem likely to affect the basic difficulties of high cost to construction and damage to fisheries. Furthermore, even if these difficulties did not exist, it would not seem to be advantageous to initiate further surveys in connection with the tidal power schemes before there are available for study the results of the recent survey by the Corps of Engineers, United States Army, of development of water and overburden, at the proposed locations of the tidal power works; the report of the New York-New England Inter-Agency Committee at present investigating the hydroelectric power potentialities and the power markets of the whole New England area and the report of the International Joint Commission on the Water Resources of the St. Johns River Basin.
>
> If, however, the United States authorities have new information regarding the tidal power schemes, and as a result feel that it would be desirable to arrange for the further investigation of these proposals, the Canadian Government would welcome receiving such information and would be glad to give further consideration to the question of some form of Canadian participation in an investigation.

I would like to read an excerpt from the letter from the Minister of Trade and Commerce in Canada, Mr. C. D. Howe, who has to do with projects of this type:

> As a matter of fact, Canada is not opposed to the project, but rather believing it economically unsound, we are not disposed to advance money for the preliminary examinations. On the other hand, we will facilitate any expenditure your Government may care to make in that regard.

As you know, the preliminary survey at the cost of $60,000 was made, and half of it paid by the Canadian Government. In fact, they appropriated the money and had it ready before the United States Government did, and that is the reason for this request for the overall, complete survey, because it came as a recommendation from that preliminary survey.

Mr. MERROW. It would appear that they are much interested in it, from what you have read.

Senator SMITH. That is our opinion. Everything that we have found indicates that they are. They were at one time concerned about the fisheries, but with the recommendation that a complete study be made of that situation, that has been set aside.

Mr. MERROW. The letter indicating that the facts of the recent survey had not been made available is interesting.

Do you know whether that survey has been completed and whether or not it was available—I believe they referred to the Army engineers, did they not?

Senator SMITH. I believe everything has been sent to them. Mr. McIntire will probably be able to answer that question more completely.

Mr. MCINTIRE. I believe the reference there is to the survey of May 1952, which is the basis upon which these bills have been submitted.

Now, I am assuming from that letter that perhaps they have not completely reviewed the survey which was made by the Army engineers and reported under date of May 1952.

Mr. LECOMPTE. That is the preliminary survey that Senator Smith just spoke of.

Mr. MCINTIRE. That is right.

Mr. LECOMPTE. That is the one Canada participated in with the United States.

Mr. MCINTIRE. It is a survey subsequent to that carried on with the use of sonic equipment, which was authorized from the President's office and the report submitted in May 1952. Canada did not participate in the most recent report of the Army engineers.

Mr. LECOMPTE. The one that Senator Smith spoke of Canada participated in, that was just a preliminary survey, and very preliminary, I suppose.

Mr. MCINTIRE. That is right; very preliminary.

Senator SMITH. I also have a letter from Thomas Worcester, Inc., and I believe you have Mr. Estes here, and I would like to include that in the hearing, also.

Mr. MERROW. Without objection, all of that will be included in the record.

Do you feel if we grant the authorization, Senator, that Canada, from your contact with the Canadian Government, would be interested or would become interested to the extent of wanting to participate?

Senator SMITH. I cannot tell you. I am sure that they are interested to the extent that they would like to see us go forward with it, and I believe when we got started that there would be interest enough if we can get the proper word into Ottawa, and that they would come into it. How much financially, of course, I have no way of knowing.

Mr. MERROW. It seemed to me from the letter you read that they had not closed the door.

Senator SMITH. Quite to the contrary, I think there has been more interest—and Mr. McIntire again will bear me out in this—I think there has been considerably more interest since the better understanding of the international project and the reasons for it than there ever has been, even at the beginning, years ago.

Mr. LeCompte. If I may interject a question or two, did Canada participate in any way in the efforts made in the thirties? That was all United States effort in the early thirties? There was some substantial amount of money spent at Passamaquoddy, was there not?

Senator Smith. When the project was first proposed, it was on an international basis, and then the United States went into the United States proposal alone, and that is when the money you speak of was spent, but this is not a part of it except as the sum of the findings and the reports that would come in.

Mr. LeCompte. With regard to your map, that green area is the upper high-level pool. Is that on the international boundary, or is that all in the United States? I should know, but actually I do not.

Mr. Kropper. I am holding my pencil on the international boundary. That to the left is Canadian waters and Canadian land.

To the left, as you face it, is United States waters and land.

Mr. LeCompte. That would be the State of Maine, then, to the left.

Mr. Kropper. That is the State of Maine, and there is the Province of New Brunswick [indicating].

Mr. Merrow. Mr. Lanham, have you any questions?

Senator Smith has just been speaking of the possibility of Canadian interest if this project is undertaken. We had just started.

Mr. Lanham. No questions, thank you. I am not familiar enough with it, the project.

Senator Smith. The other day, Mr. Chairman, you asked something about the International Joint Commission, and our working through the International Joint Commission.

Mr. Merrow. Yes.

Senator Smith. I wanted to advise you that an international project involving the waters between the two countries comes under the jurisdiction of the International Joint Commission.

Mr. Merrow. Even if Canada does not participate in the survey, and we decide to go ahead with it, it must be under the jurisdiction of this Commission.

Senator Smith. That is according to agreement.

Mr. Merrow. Apparently, that settles it. The question was raised whether, if Canada does not want to go along, would that be the agency to do it, or would we have some other agency, and I think that answers it.

Is there anything else before we go ahead?

Senator Smith. I do not believe I have anything unless you have some questions you would like to ask. If I disappear hurriedly, you will know it is because the Senate is calling. We are in session at 10 o'clock.

Mr. Merrow. Mr. McIntire, you may proceed.

Mr. McIntire. Now, Mr. Chairman, I am going to suggest that the next witnesses be from the Army Corps of Engineers with General Chorpening the first witness.

May I suggest that that map be moved down a little farther and the other associates may be able to follow the witness, if that is not too far.

Mr. Chairman, may I present General Chorpening, Assistant Chief of Engineers for Civil Works, Corps of Engineers.

STATEMENT OF BRIG. GEN. C. H. CHORPENING, ASSISTANT CHIEF OF ENGINEERS FOR CIVIL WORKS, CORPS OF ENGINEERS, ACCOMPANIED BY EUGENE WEBER, SPECIAL ASSISTANT TO THE ASSISTANT CHIEF OF ENGINEERS FOR CIVIL WORKS, CORPS OF ENGINEERS; HERMAN KROPPER, CHIEF OF PLANNING AND REPORTS BRANCH, NEW ENGLAND DIVISION, CORPS OF ENGINEERS; AND JOHN W. ROCHE, CORPS OF ENGINEERS

General CHORPENING. I have with me Mr. Herman Kropper of our New England division in Boston, and Mr. Eugene Weber, and Mr. John Roche from my office here.

I think first it would be well if a I read the letter of the Secretary of the Army, which contains the official comments of the Secretary on Senate Joint Resolution No. 12, which is identical to the resolution I believe you have under consideration here. It is dated July 20, to Senator Wiley, chairman of the Committee on Foreign Relations. [Reading:]

Reference is made to your request for the views of the Department of the Army with respect to Senate Joint Resolution 12, 83d Congress, a bill to authorize and direct the International Joint Commission on United States-Canadian Boundary Waters to make a survey of the proposed Passamaquoddy tidal-power project, and for other purposes.

The Department of the Army has considered the above-mentioned resolution, the purpose of which is well stated in the title.

The Department of the Army has no objection to the proposed survey. It is recommended, however, that the bill be amended to authorize that the survey be made by the Corps of Engineers in accordance with the regular procedure for investigation of water-resource projects. The reasons for this recommendation are summarized in the following paragraphs.

The Corps of Engineers in 1935 carried on a large amount of engineering in connection with the then proposed construction of the Passamaquoddy project. This material is available in the records of the Corps of Engineers and would be of great value in any new survey to be undertaken. Also, valuable data are available in the records of the Corps of Engineers from subsequent studies of the Passamaquoddy project made in 1949 as part of the reference of November 9, 1948, to the Internatinal Joint Commission and from other studies and tests that have been made over the past several years in the Passamaquoddy area. The personnel of the Corps of Engineers include men who are intimately familiar with these data and the previous studies. General Sturgis, the Chief of Engineers, personally has a detailed familiarity with the project having been assigned to Passamaquoddy from 1935 to 1937 in its initial stages. The corps has in its New England division office, at Boston, an existing organization which could readily carry out the proposed survey. For these reasons, it appears that the proposed survey could most effectively and economically be prosecuted by the Corps of Engineers.

The referral of proposed studies to the International Joint Commission is accomplished by concurrent action of the Government of the United States and the Government of Canada, with costs to be incurred by both countries. Therefore, the concurrence of Canada would be necessary before the survey could be undertaken by the International Joint Commission as proposed in Senate Joint Resolution 12. From information available to this Department, it appears that Canada would be reluctant to join in this investigation as a joint undertaking and, in fact, would be likely to decline entirely, with the result that the survey could not be carried forward.

On the other hand, the report of the Engineering Board contained in the report of the International Joint Commission dated October 23, 1950, indicates that Canada would not object to the carrying out of a study of the Passamaquoddy project by the United States alone, entirely at the expense of the United States. On this basis, an authorization for the survey by the Corps of Engineers would

accomplish the desired objective of the bill without involving Canada in the activity at this time.

A draft of an amended bill, as suggested above, is enclosed.

It is estimated that the cost of the survey will be $3 million.

The Bureau of the Budget advises that while there would be no objection to the submission of the proposed report to the committee, no commitment can be made at this time as to when any estimate of appropriation would be submitted for the survey if authorized by Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation.

Sincerely yours,

ROBERT T. STEVENS,
Secretary of the Army.

Senator SMITH. Mr. Chairman, may I ask that the date of that letter be given.

General CHORPENING. July 20, 1953.

The letter that I have just read, I think, pretty completely presents the views of the Department of the Army and of the Chief of Engineers.

In order to thoroughly clarify any doubts that might be in the minds of those here about the surveys that were mentioned earlier, perhaps I should state that the $60,000 survey referred to was the one made under the auspices of the International Joint Commission in which the Corps of Engineers participated. It was made looking toward a determination of what the cost would be to make a proper survey of the international Passamaquoddy project.

Subsequently, in 1951, the President authorized the Corps of Engineers to make further studies with the object of determining whether certain sonic apparatus might be appropriate for use here and might be helpful in reducing the estimated cost of the survey. Those studies and field experiments were made, and as a result it was concluded that the original estimate of $3,900,000 for the survey could be reduced to $3 million.

Mr. LECOMPTE. Now, General, I do not know a thing about surveys, but what would that $3 million survey constitute? Would that constitute also complete blueprints, specifications, and detailed planning for the project, or would it?

General CHORPENING. No, sir; it would not go so far as to include preparation of the detailed plans upon which bids could be asked for, for construction.

It would go to the extent of making complete field investigation, surveys, subsurface explorations necessary to determine the depths of water and foundation conditions and all of those things which must be had to determine the waterflow, the economics, and so forth.

Mr. LECOMPTE. Then, in an event of that kind, does the Chief of the Army Engineers write and include a very firm recommendation as to whether the project is advisable?

General CHORPENING. Yes, sir.

Mr. LECOMPTE. He does?

General CHORPENING. Yes, sir.

Mr. LECOMPTE. Whether in his opinion it would be worthwhile. There would be an estimate of the cost and the Chief of the Army engineers would give his very definite and considered opinion as to whether it is a desirable project or not.

General CHORPENING. Yes, sir. We would determine an estimate of the cost, an estimate of the benefits to be derived, how much power

could be produced, and then a balance of the costs as against the benefits.

Mr. McINTIRE. Might I also add, Mr. LeCompte, that of that $3 million, $300,000 is estimated as the cost of a survey of the impact on the fishing industry that is associated with this area. That aspect is included.

Mr. MERROW. May I ask at that point, has the remainder of the $3 million been broken down for surveys in reference to different things?

General CHORPENING. Yes, sir; we have very complete information here, and we can go into as much detail as the committee might desire with respect to the breakdown of the estimate.

Mr. LECOMPTE. How long do you say it would take to make that survey?

General CHORPENING. Two years, we estimate. That is assuming we had the adequate funds available to us.

Mr. McINTIRE. May I state for the general's information, Mr. Chairman, that we were granted permission to include in the report up to page 26 of the May 1952 report which includes a breakdown of the estimates which make up the figure. That is a part of the record in the previous hearing.

Mr. MERROW. Well, General, this is a public hearing, and everybody is much interested in this.

Can you give us a brief sketch? We would like to determine whether it is necessary to have the $3 million authorized or whether it can be done more cheaply.

General CHORPENING. I think it might be well if I would read a paragraph of a letter, with Senator Smith's permission, which General Sturgis wrote to Senator Smith covering that matter:

> The limited information contained in the letter from Thomas Worcester, Inc., is not sufficient to determine whether the offer of $1,500,000 is intended to cover all of the items of work listed as necessary for the survey in the 1950 report of the International Joint Commission.
>
> It would be necessary to make a careful analysis of the detailed schedule of work contemplated by the company before constructive comments could be offered.
>
> It should be noted that the scope of survey and estimate of cost outlined in the 1950 report of the International Joint Commission were prepared after thorough and careful consideration of all available data, and actual conditions in the field on both sides of the boundary.
>
> Because of the international aspects and the nature of the work, the survey should be carried out under the supervision of a governmental agency.
>
> If the Corps of Engineers were authorized to undertake the survey, I can assure you that consideration would be given to accomplishment by private engineering firms of all or any portions of the work which could be accomplished in that manner at a savings to the Government.

Senator SMITH. Would you include the date of that?

General CHORPENING. The date is May 22, 1953.

We feel, based on the experience the Corps of Engineers has had with the earlier Passamaquoddy investigations and construction and with the work that we have done for the International Joint Commission, that we have a very good background of engineering data which has been incorporated into our estimate. We think it is a good, sound estimate of the requirements for a study to determine that either this is an economic project or it is not. It is a large undertaking.

Now, admittedly, any estimate of a survey cannot be pinpointed as closely as an estimate for a specific piece of construction, but I think it is a good, sound estimate.

I would be very glad, if the committee would like to have a little more detail on the makeup of the estimate, to have Mr. Kropper explain it to the committee.

Mr. MERROW. We would like to have that for the public record. I think it would be helpful.

General CHORPENING. Would it be best to have Mr. Kropper give just a brief outline of the contemplated project for a few minutes?

Mr. MERROW. I think so.

STATEMENT OF HERMAN KROPPER, CHIEF, PLANNING AND REPORTS BRANCH, NEW ENGLAND DIVISION, CORPS OF ENGINEERS

Mr. KROPPER. The Quoddy tidal power project is located in northern Maine, at Eastport. It consists of two power pools known as the high and low level pools. The high level pool includes Passamaquoddy Bay and is about 100 square miles in area. The lower pool is made up of Cobscook Bay, and is about 27 square miles in area.

I pointed out earlier that the international boundary goes in this general direction [pointing] so that the project is very definitely of an international character. A large portion of the high-level pool is in Canadian waters.

The function of the project might better be demonstrated by this schematic sketch which I have.

Mr. KROPPER. The upper view shows operating conditions with the tide at low stage. At such times as the tide is at a low stage, the gates through which the upper pool is filled at this point here [pointing] known as Letite Passage, are closed, and the upper pool is maintained so that the water flows from it through the powerhouse into the lower pool and thence out to sea.

In other words, water flows through the open intake gates at Letite Passage during periods of high tide and fills the upper pool. When the tide begins to fall the gates are closed and the water is trapped in the area colored in green.

Water continually flows from the upper pool through the powerplant into the lower pool which is the area colored in brown. It is retained in this pool until the tide reaches a low stage when the emptying gates are opened and the water flows out to sea.

The lower sketch here shows the conditions at high tide. The flow of water is through the filling gates into the upper pool, through the powerplant, into the lower pool. The emptying gates are closed during periods of high tide.

It will be noted that at certain stages of tide the lower pool is rising and the upper pool is falling so that the amount of power that would be derived from the project varies.

Mr. MERROW. What is the estimate on the variability? I was under the impression that the generation would be constant.

Mr. KROPPER. Power would be generated 24 hours a day, 365 days a year. The tides are something that we know a lot about. They are very predictable. Their behavior is known for years to come. They are more consistent than the flow in our streams for hydroelectric power, the point being that there is some variance in the amount of power. It does vary to some extent when the upper pool falls and the water flows into the lower pool.

Mr. McINTIRE. There is never a time, but what you have a head of water in the upper pool of something like 15 feet.

Mr. KROPPER. You are producing power 24 hours of the day, each hour of the day. The variance in power is directly related to the head. Depending on the size of the installation it may or may not be of a substantial nature.

Mr. MERROW. Then it would not be necessary if the project were put in, to have an auxiliary plant to produce more power to put into the system when this particular system is at its lowest production.

Mr. KROPPER. No; it would not be necessary to provide an auxiliary plant. However, some consideration has been given in studies that have been made as to an interconnection between a tidal powerplant of this character and hydroelectric plants, say, on the St. Johns River, or the Kennebec or the Penobscot, but that is not necessary for the operation of the project.

Mr. LANHAM. It is firm power, then?

Mr. KROPPER. It is very firm power. As I have said, we have droughts and we have floods and other conditions which materially affect our various hydroelectric plants, but the tide is the one thing that you can prophesy, because you know what it is going to do from day to day. It just does not change.

Mr. MERROW. Senator Smith.

Senator SMITH. Mr. Chairman, it might be of interest for the record to indicate what the tide is. As I remember, it was 6 feet down in the southwestern part of Maine, and it goes up to 30 feet in Passamaquoddy Bay and 52 feet in the upper Bay of Fundy.

Mr. KROPPER. That is correct. Passamaquoddy Bay is really an arm of the Bay of Fundy. The tides in the Bay of Fundy reach a maximum height of around 52 feet. The tides at Quoddy vary from a maximum of 26 feet down to a height, I would say, of about 13 or 14 feet. The average tide is about 18 feet.

Mr. MERROW. At what time of day would this lowest production of electricity take place? Has your survey determined that?

Mr. KROPPER. You have two tidal periods in a period of about 25 hours, so each day your change in capacity is about an hour later. It is never at the same time at each day. The tides also vary over a period of 18 years. It takes about 18 years for a complete cycle of the behavior of tides.

Mr. MERROW. With some industrial concerns taking power from Passamaquoddy, providing it were developed, this variability in the production of electricity would not interfere with the production of their plants; is that correct?

Mr. KROPPER. That is correct.

General CHORPENING. I think that the fact that for so many years ahead you can predict exactly the amount of power that will be available at any one time is quite important here.

Mr. MERROW. A survey such as we propose would have that accurately outlined, would it not?

Mr. KROPPER. It would, sir. As General Chorpening has stated, we could tell you in the year 3000, just how much power you would get on a particular day if you should ask, because the tides are that predictable.

Mr. MERROW. Mr. LeCompte, do you have any questions?

Mr. LECOMPTE. I do not not believe I think of anything right at the moment.

Mr. McINTIRE. Mr. Kropper, I might point out, as you probably have in mind anyway, that in the establishment of this project there is no taking of land. It does not flood any land which is not now under water at high tide. Am I correct?

Mr. KROPPER. We would only be obliged to take a few acres which would cover the location of the powerplant. All of this area here [pointing] is normally flooded at high tide, and there would be no land taking.

Mr. McINTIRE. This pool would be brought up to a level which is now the level of high tide, and no higher than that.

Mr. KROPPER. There would be no disruption to the community or the area.

Mr. McINTIRE. I point that out because in contrast to many hydro projects there is a lot of expenditure involved in the taking of the area which is used as the reservoir to store the water for the hydroplant, and this does not involve the dislocation of anybody or any facilities or any of the economy now associated with the shoreline there.

Mr. KROPPER. Speaking of the shoreline and the waters, if I may, you can see there are a number of islands. These islands make possible a number of combinations of structures that might be built. They would have to be studied to determine which is the most economical combination. That is one of the problems that confronts us. There are basically five different schemes.

The red lines shown on the map are locations of dams.

Mr. LANHAM. Mr. Chairman, may I ask this question: Has there been a rough estimate made of the cost of the project or the construction of the project?

Mr. KROPPER. No, sir. To my knowledge, there has not been a rough estimate made of it. There are too many intangibles, as far as I personally am concerned, to even offer a guess as to the cost of the project. I don't know.

Mr. LANHAM. Until after the survey is made, you would not know.

Mr. KROPPER. Until the survey is made, there are too many intangibles.

We were very encouraged from an engineering standpoint with the results of the sonic investigation that was made a year or so ago.

When the corps first conducted some explorations at Eastport, they made some borings in the vicinity of Lubec Dam, and found there was a lot of mud on the bottom.

We naturally assumed that that condition might exist at the location of other dams. The results of these sonic investigations has shown us that the bottom in these areas is relatively clear and free from that kind of material. This will substantially reduce the cost of any project which might be built there. It is conditions like that which makes one hesitant to even offer some idea of the cost.

Mr. LECOMPTE. There was some construction work done in 1935.

Mr. KROPPER. Yes, sir.

Mr. LECOMPTE. Where was that on the map?

Mr. KROPPER. That was the construction of two small dams at Carlow Island and Point Pleasant. They are in this particular area.

Mr. LECOMPTE. Are the works still there?

Mr. KROPPER. They are still there.

Mr. LECOMPTE. Are they of any value?

Mr. KROPPER. Yes, they are of definite value, depending on which scheme might prove to be the most economical. This is the basic Dexter Cooper scheme as portrayed here, and they are definitely a part of that scheme.

Mr. MERROW. Is it proposed to build all the powerplants in one place down there?

Mr. KROPPER. Yes, sir. There would be one long powerplant with the generating equipment all housed in one structure.

Mr. MCINTIRE. From the standpoint of the corrosive action of salt water, are there alloys now available which are practical to meet that problem in turbines, and things of that sort?

Mr. KROPPER. We think so.

The Corps of Engineers at the present time is conducting investigations on concrete samples in the Eastport area. We have had samples of blocks of concrete immersed in the salt water for a number of years. Some of these samples are alternately exposed at low tide and covered at high tide, and others are constantly under water and we have studied the various concrete designs, the mixes, in order to definitely ascertain what aggregate gives us the best concrete for use under these conditions.

Mr. MCINTIRE. Some of these dams would be filled dams?

Mr. KROPPER. They would be stone- and earth-filled dams.

Mr. MCINTIRE. It would be safe to say that there is plenty of stone within reasonable hauling distance for any kind of construction.

Mr. KROPPER. There is plenty of stone there. That is one of the problems we would have to study in the survey—the economies of quarrying that stone and getting it there in the largest pieces possible.

For your information, the largest dam would be that which is located between Deer Island, and Moose Island. This dam would be about 6,000 feet long. That would be the shortest possible length, and it would be longer if you turned it on its axis. It would have a maximum height of 225 feet from the bottom to the water surface. That would be the minimum dimensions of a structure at this location.

Mr. MERROW. That would be the largest and that is not large as dams go.

Mr. KROPPER. No; it is not large as dams go, but the greater portion is under water. The portion exposed would be around 30 or 35 feet. It does present some problems as to placing of material in the bottom here.

Mr. MERROW. Could you discuss briefly the other dams?

Mr. KROPPER. The dams at Letite Passage are basically filling gate structures. Their total lentgh is 2,500 feet. There are some deep holes there. The maximum height is around 200 feet, but most of these areas are limited to about 50 feet in height.

The Eastport Dam is 3,500 feet in length. Its maximum height at the deepest point of water is 140 feet.

The Lubec Dam is about 3,500 feet long, and its maximum height about 80 feet.

These are just one combination of structures that would have to be built to contain the upper pool and the lower pool. It is possible that we might have a different combination at the time the study is completed, because of economic or technical reasons.

Mr. MERROW. Mrs. Smith.

Senator SMITH. Would you tell us something about the construction of the dams? The other day there was some discussion as to whether it would be of earth or clay or rock or cement.

Mr. KROPPER. It is contemplated from what we know now—and it is somewhat of a speculation on my part, because I am trying to prejudge the survey that is being asked for—that these structures would be constructed of a combination of earth and rock. The structures that have been completed are basically earth structures—that is earth cores with a rock facing. They have been in operation since 1936. I looked at them this year, and they are in good condition. It thoroughly demonstrates that that type of construction is satisfactory in the area.

The larger dam would be basically constructed of rock, or we think it would, at this time. One reason we would go to a rock structure would be for the ease of placing rock in water. As the channel is gradually closed, the currents at certain times would be quite swift and would tend to wash earth material.

The filling gates and the emptying gates would be located in concrete structures. The gates would raise and lower on a vertical plane to permit the water to enter and discharge from the pool.

Mr. MERROW. Do you want to make an estimate, provided a survey were made, and this project were constructed, as to the amount of electricity which would be produced?

Mr. KROPPER. It would be entirely speculative. I would say that this project would probably develop power of the capacity about equal to McNary Dam, or about half of that produced at Grand Coulee. I am taking those two specific projects because you are familiar with them.

General CHORPENING. To determine that is the purpose of the survey. That is very much of a crystal-ball statement at this time of what we think it might be.

Mr. MERROW. We had some general statements here the other day ranging—correct me if I am wrong—from 20 billion kilowatts to 30 billion kilowatts.

Mr. KROPPER. Your utilities utilize power on the basis of about a 30-percent capacity factor. In other words, the plant produces power 30 percent of the time. Industries step up that capacity factor. In a paper mill, for example, it gets up to 60 or 70, or even higher. The actual capacity is a function of the load that might be employed.

Mr. LECOMPTE. Will the survey have a definite recommendation as to whether the construction should be done by and owned and operated by private interests or whether it should be a public power project?

Mr. KROPPER. I have not considered that question. I would defer to General Chorpening on that.

General CHORPENING. It would seem to me that the directive of the Congress to make the survey would be to determine the economics of the project and report to the Congress, and then it is for the Congress to conclude whether they would want it done by Government or by private power agencies.

Mr. LECOMPTE. I thought maybe the survey would have a recommendation, recommending whether it ought to be a public power project.

General CHORPENING. I think that it is a matter of policy rather than engineering.

Mr. LANHAM. That is a political question.

Mr. LECOMPTE. The Chief of the Army engineers probably would not want to make a recommendation on that point.

General CHORPENING. I think that point would be in the realm of policy rather than engineering.

Mr. LANHAM. Mr. Chairman, going back to the amount of power produced, what is the capacity of the McNary Dam?

General CHORPENING. The installed capacity of McNary Dam is approximately 1 million kilowatts.

Now, the proposed average anual energy that we will get out of McNary, I do not have with me. I could supply that for the record.

(The information requested is as follows:)

The expected energy output from McNary Dam with a 980,000 kilowatt installation is 6,400,000,000 kilowatt-hours annually.

Mr. LANHAM. No; I noticed he likened it to the McNary Dam, and I just wondered what that meant in kilowatts.

Mr. KROPPER. That is about 1 million. That is the figure I was thinking of when I referred to McNary.

General CHORPENING. That is installed capacity.

Mr. LANHAM. Thank you.

Mr. MCINTIRE. Mr. Chairman, I might say along the lines that Mr. LeCompte is exploring, Maine at the moment has no reserve of power. There is constant development of power facilities on the part of private companies to meet the increasing load, and there is no appreciable reserve in the facilities already established or in construction.

I am expressing my own personal thought; but I think if this survey should prove that the development of Passamaquoddy is economic, that it will be a real challenge to private industry in Maine to look it over very carefully from the point of development by private industry.

Mr. MERROW. That dam at the extreme right is on Canadian soil, is it not?

Mr. KROPPER. This is an international dam, sir; it crosses the boundary. This is Canadian water, sir [indicating]. These are the filling gates where Passamaquoddy Bay is filled from the sea.

Mr. MERROW. There is no possibility of a powerplant being built where the dams are going in on the extreme right, in Canadian territory?

Mr. KROPPER. We don't think so, on the basis of what has been studied to date.

Now, the plans that have been advanced by the International Joint Commission which is made up of Canadian and United States engineers generally settled on the location of the powerplant in this area [indicating]. The project does not lend itself to construction of a powerplant at Letite Passage.

The powerhouse basically has to be between the upper pool and the lower pool.

Mr. MERROW. Are there any other questions?

(No response.)

Mr. MERROW. You may proceed.

Mr. MCINTIRE. Do you have anything further, General?

General CHORPENING. I have nothing further, unless you want a little more information on the breakdown of the survey funds.

Mr. MERROW. Yes; give us that.

General CHORPENING. I mean the survey estimate.

Mr. KROPPER. I am going to boil this down to the minimum unless you want it in great detail. I have it either way you like, sir.

The preliminary investigations, which include a review of all previous studies, the assembling of useful information, reconnaissance surveys, and estimates of public hearings are estimated to cost $50,000.

Field surveys, including all aerial, topographic, and geologic surveys required for the tidal-pool areas and tidal structures are estimated to cost $328,000.

I might interrupt and state that I have the man-hours and the number of men that would be employed on each phase of this work here as well, if it is desired.

Hydrographic investigations providing for fathometric explorations, prediction of tides, a study of the effect of wind, waves, and barometric pressures on water-surface elevations, determination of underwater velocities, and stream gaging, is estimated to cost $182,000.

The effects of the project on the area in general, is estimated to cost $10,000.

Foundation explorations—this is our big item—provides for drilling in depths of water up to 300 feet at an estimated cost of $250 per linear foot. It includes test pits, augur borings, and hand-drill holes. That item is estimated to cost $623,000.

Materials and laboratory investigations are estimated as $362,000. It includes the costs of tests and analysis of foundation samples, overburden in deep-water tidal dams, concrete aggregates, fill material for dams, and the effect of sea water, moisture, and waves on structures and equipment, and all model tests.

Hydraulic and power studies are estimated to cost $194,000.

The preliminary design of project structures will cost $479,000. This includes dams, locks, powerhouse, filling, and emptying structures and such relocations.

The study of a construction plant and the facilities necessary to build this project would be $40,000.

A study of the lands and rights-of-way involved, $50,000.

Power-market studies for the project output, $62,000.

Transmission-system studies to transmit the power to markets, $21,000.

Preparation of cost estimates, $75,000.

Study of any supplementary sources of power and interconnections, $42,000.

And the preparation of the report is $98,000.

We also have an item for consulting services. We feel that this project is of such a character and magnitude that it will require some of the best technical advice obtainable.

For that reason, we anticipate a number of consultant meetings for the purpose of reviewing design proposals, and we estimate that they will cost $84,000.

That is a brief breakdown of the component parts.

Mr. LECOMPTE. How much did the McNary Dam cost? Do you happen to recall?

General CHORPENING. The estimated cost of the McNary Dam, as I recall, was approximately $290 million.

Mr. LeCompte. That was at a time when construction was considerably less than it is now.

General Chorpening. McNary Dam is still under construction, sir.

Mr. LeCompte. It is not complete?

General Chorpening. No, sir. We will not get the first power on the line there until this fall.

Mr. LeCompte. Well, Coulee is completed.

General Chorpening. Grand Coulee is completed; yes, sir.

Mr. LeCompte. There are others out in that area.

General Chorpening. Bonneville is completed.

Mr. LeCompte. What was the cost of Bonneville and Grand Coulee, if you remember?

General Chorpening. I do not remember about Grand Coulee. That wasn't built by the Corps of Engineers.

Bonneville was built by the corps. That has a power installation of approximately 500,000 kilowatts. I am speaking from memory now, but I believe the cost of that was about $125 million. I would like to check that for the record, however. [The corrected figure is $83,333,600.]

I would like to point out that in those dams on the Columbia River there is a very considerable cost that has to be borne to take care of the fish problem. They must build in fishways and elevators, which adds to the cost.

Also, in both the cases of Bonneville and McNary, we have navigation locks as a part of the project.

Mr. Merrow. Are there any other questions at this point with reference to the breakdown of the surveys?

General Chorpening. May I correct my statement on Bonneville, now? It is $83,333,600. Of course, Bonneville was built, as you will recall, in the 1930's, when construction costs were about, I would estimate, 40 percent of what they are at this time.

Mr. LeCompte. Did you estimate McNary's completed cost at $290 million?

General Chorpening. Actually, it is $286,950,000.

Mr. Merrow. Are there any other questions?

Mr. McIntire?

Mr. McIntire. We have nothing further.

Mr. Merrow. Does that complete the Engineers?

General Chorpening. Unless there are further questions, sir.

Mr. Merrow. I guess there are none, General.

General Chorpening. We might mention the matter of locks here. There will be some locks.

Mr. Kropper. In the conceiving of the project and to provide for the continuance of navigation, fishing, and the like, it is proposed that a lock would be constructed adjacent to the filling gates in this particular area [indicating Letite Passage], and a lock would be constructed in the waterway between Moose and Deer Islands. There will be a lock also adjacent to the Eastport Dam, so as to provide continuance of all navigation to existing facilities. It would not disrupt navigation in any sense.

Mr. MERROW. Thank you.

Mr. MCINTIRE. I might say that in that arm which goes up to the left, that goes up toward the mouth of the St. Croix River, and the city of Eastport, and on the Canadian side of that portion of water there are Canadian business firms, fertilizer factories, and miscellaneous business firms. There is a textile mill on the Canadian side above Calais. There is also some industry in Eastport, which is served by water, necessitating continuation of navigation through these waters.

Mr. LECOMPTE. Locks would not disrupt navigation, but it would slow it down, is not that true?

General CHORPENING. It would slow it down somewhat; yes, sir.

Mr. LECOMPTE. It slows it down on the Mississippi River at Keokuk.

General CHORPENING. Yes, sir. If you have locks it takes time to go through it. On the other hand, if you do not have locks, you could not have any navigation.

Mr. CARNAHAN. Do the gates work automatically so that the water will come into the high-pool level when the tide is higher than the level of the water in the pool? Is it an automatic process?

Mr. KROPPER. We would expect that the gates would be automatically controlled. That is something that would be determined by the survey. If you ask me what I think it would be, I will say they would be automatic.

Mr. CARNAHAN. That is the filling of the one pool and the emptying would be an automatic process.

Mr. KROPPER. I don't think there is any question but that the gates would be automatically operated.

Mr. MERROW. Mr. Kropper, if you wish to extend your remarks in any more detail in the record on the proposed breakdown of the survey, you are permitted to do so.

Mr. KROPPER. Thank you, sir.

Mr. MERROW. If there is nothing more from the Engineers, Mr. McIntire, you have some other witnesses.

Mr. MCINTIRE. The next witness is Mr. Roscoe Estes of the engineering firm of Thomas Worcester, Inc., in Boston. Senator Smith has been in contact with these folks, and I would be most appreciative if Senator Smith would introduce the witness.

Mr. MERROW. Senator Smith.

Senator SMITH. Mr. Estes, I think perhaps you can introduce yourself for the record. I am very glad that you were able to come down and that the committee was willing to hear you.

STATEMENT OF ROSCOE E. ESTES, ADMINISTRATIVE ENGINEER, THOMAS WORCESTER, INC., BOSTON, MASS.

Mr. ESTES. I believe the committee has my name and my position of administrative engineer. I don't intend to tell you anything about Quoddy. I think my purpose in being here is to satisfy the committee that our quotation is sincere, and that we are prepared to carry through on that basis, and to give you some idea of our experience in the field of engineering.

Mr. MERROW. You had an estimate—I believe it was brought out at the public hearing the other day—of $1,500,000, if I am correct, and at Senator Smith's suggestion we felt that the committee should hear from the firm that has made the estimate.

You may proceed.

Mr. ESTES. The Senator has made a matter of record a copy of our letter to her, and if I may, I would like to read it so that the committee will, if they haven't already seen it, will get the background of our offer.

This letter is dated May 12, 1953.

As engineers of many years' experience, we have been extremely interested in the proposed Quoddy project. Just recently we have had access to and have examined and studied all of the correspondence, estimates, plans, and engineering data compiled by the late Dexter P. Cooper, its originator and engineer.

All of this most valuable data and information, together with a report of the results of extensive sonic underwater foundation explorations made by the United States engineers, with surveys and studies made by the State of Maine, the United States engineers and others, we believe if assembled, coordinated and analyzed would be a long step toward providing an answer to whether or not this is a feasible and economic hydroelectric development.

Such a study and report would necessarily be supplemented by revisions and readjustments of existing plans and specifications. New estimates of cost and further economic surveys and studies of the advantages or disadvantages, if any, of this project to the New England States, particularly the State of Maine and to the Canadian Province of New Brunswick.

It was originally estimated that the cost of a survey with preliminary plans and specifications providing estimates of cost of the entire project and the estimated cost per kilowatt would be $3,900,000.

If all of the information regarding this project in the files of the United States Engineers, the estate of Dexter P. Cooper, State of Maine, or elsewhere is made available to our engineers, we are prepared to submit a complete report to the International Joint Commission based upon the items of the survey recommended by the International Passamaquoddy Engineering Board as of March 1950, for the sum of $1,500,000.

That is predicated upon our engineering department receiving all of the available data.

In reference to the $1.5 million, our engineering department has broken it down as to their estimates. Would you like me to read each item?

What we did in making our estimate was to take this blue book, and we took the items of the estimate, "Cost of proposed survey," and took each item, taking into consideration what had already been done, the information available, what we had seen, and what we knew was available, and have made a new estimate on each item.

That was done by our consultant, our hydroelectric expert, and I have it here if you would like to hear it.

Mr. MERROW. We would certainly like to have it for the record.

You may proceed if you would like to read it.

Mr. ESTES. I took each item just as the engineers have. Taking into consideration all of the preliminary work that has been done, we have come up with $1.5 million as the cost.

(The paper referred to is as follows:)

ESTIMATED COST OF PROPOSED SURVEY

The following table breaks down the cost of various items in the complete survey of Quoddy, proposed in March 1950, by the International Passamaquoddy Engineering Board.

	Estimated cost
Preliminary investigations	$10,000
Field surveys	100,000
Hydrographic investigations	100,000
Fishery and miscellaneous investigations	50,000
Foundation explorations	311,000
Material and laboratory investigations	100,000
Hydraulic and power studies	100,000
Design of project structures	350,000
Construction plant and facilities	30,000
Lands, relocations, damages	30,000
Power market for project output	40,000
Transmission system to power market	19,000
Cost estimates	60,000
Alternative sources of power	60,000
Preparation of report	75,000
Consulting service	65,000
Total	1,500,000

Mr. ESTES. I would like to explain that we are not in competition with the Engineers. We did not know that they had a price in. Our entire figure is based on what we had here and what we saw and not upon any figure that the United States Engineers may have had in or may have been contemplating. I think our offer was prior to the letter from the United States Engineers.

Senator SMITH. Mr. Estes, you might explain that this blue book is a brochure gotten out by Maine Development Commission under the direction of the Government.

Mr. ESTES. It has on the last page the estimated cost of the various items of the survey and from what we have made up our estimate.

The Worcester Co.—if I may just take your time for a minute on that—I will read part of it and then if I may, I will leave it as part of your record.

Graduating from Harvard College, J. R. Worcester served as chief engineer for the Boston Bridge Works for 11 years and in 1893 opened his own office in Boston, Mass., for the practice of civil engineering. In 1904 he organized a partnership under the name of J. R. Worcester & Co. In 1924, Thomas Worcester, son of J. R. Worcester, also a graduate of Harvard College, became a partner in the firm. Following the dissolution of the partnership of J. R. Worcester & Co. in 1946, he organized the firm of Thomas Worcester, Inc., and associated with him as employees and department heads many of the personnel of J. R. Worcester & Co.

These firms continuously and successfully engaged in the practice of civil engineering, consulting structural engineering, and industrial architecture for almost 60 years. Their reputation as leaders in their profession is recognized and respected.

During the past 7 years Thomas Worcester, Inc. has increased its engineering organization and personnel to include leading architects and engineers. Its practice has been extremely diversified. It has completed many surveys and reports. It has completed the design and engineering of all types of structures, both above and under

ground, bridges, overpasses, underpasses, highway surveys, and layouts. It has departments for mechanical and electrical engineering, heating and ventilating, hydroelectric surveys and plans, plumbing, sanitation, water supply, sewage disposal, and construction. Each department is under the supervision of a man experienced and trained in his profession.

It has formed many associations with engineering firms and individuals, when expert technical consulting assistance in any specialized field of engineering was essential.

In 1944, an office was established in Mexico City, Mexico, under the name of Cia. Worcester de Mexico, S. A. It completed very extensive explorations and studies under a contract with the Empresa Hidroelectrica de los Volcanes de Mexico, S. A.

It employees at this time in its staff, office force, and other departments, not including its construction department, 153 persons—department heads, engineers, architects, draftsmen, and clercial force.

During this half century and more, these firms were commissioned for more than 15,000 major projects with a construction value in excess of $700 million. Much of this work, in addition to that for private industry, was performed for the United States Departments of the Army and Navy; National, State, and municipal governments; insurance companies, colleges, and universities.

Financial reference: First National Bank of Boston, 67 Milk Street, Boston, Mass., Mr. Ben Ames Williams, vice president.

I may say that our relations with the engineers have been very cordial. One of our jobs was Camp Miles Standish in Massachusetts, where we were the engineers and did the entire work. That was for a 40,000-man camp.

We have worked at the Watertown Arsenal, the Springfield Armory at Bristol, Conn., and we made as-built drawings for all of the New England coastal installations along the east coast. They are built according to plan, but as they are built there are variations from the original plans and we as engineers made as-built drawings for the entire work.

We also developed for the Navy a plan for underground oil-tank storage, which has been adopted as a matter of fact—it was floating in quicksand and has been adopted as a standard plan by the Navy.

During the last year we have installed all through the country—I don't know whether this is confidential matter, I won't give the names of the cities, but at any rate we have provided almost 2 million barrels of storage facilities for jet fuel. That is for storage and distribution through the country for the Navy.

Ordinarily, our personnel is approximately from 180 to 200 men. We own our building at 85 State Street. We are using half of the adjoining building. We have about 22,000 square feet of space, and there isn't any type of engineering project in past years that we haven't in some way had a part in. I mean as a diversified practice.

We therefore feel, with our experience, with the number of men we have who are available—and we will do exactly the same as the United States engineers would do. There are many phases of this project that will require expert specialists whom we would employ and work with to get the best design and the best development possible.

Mr. LeCompte. Let me ask you this, if I may, if it is a fair question:

How can you do it for half of what it costs the Army engineers?

Mr. ESTES. We are not trying to do it at half the cost of the engineers. It is a job to us, and we estimate we can do it for $1.5 million. I am not trying to compete with the engineers. I didn't know the engineers had this price in when I sent the letter to Senator Smith. We made this up as a job. It may be that we can handle it more economically, we can handle it with more dispatch and there won't be so much wasted time or maybe not so much redtape—I don't want to criticize the Army or the Navy, but I think it is the type of project that a private engineering firm can do for much less money than the Government can.

As a matter of fact, from what I have heard here, without being critical, the engineers have apparently brought this thing to such a complete state that I don't see where they can spend $3 million on it. That is my feeling about it. That is based on our engineers' studies of what it will cost to complete this survey.

Mr. MERROW. Mr. Hays.

Mr. HAYS. No questions, Mr. Chairman.

Mr. MERROW. Mr. Carnahan.

Mr. CARNAHAN. No questions.

Mr. ESTES. Here is the final report on Camp Miles Standish, which is quite a sizable document. We have made many reports on various items.

Here is a report on Fort Point Channel, South Bay, filling it in and using it for an overhead structure. That is the type of work that we turn out.

I also think that the United States Engineers' office know us, know our capabilities, and know our organization. We have worked for them, and with them. That is also true of the Navy.

Mr. MERROW. Mr. McIntire.

Mr. MCINTIRE. Mr. Estes, in the items which you have submitted here in your estimate, I notice that the survey relative to the impact of this project on fishing industry is not included.

Mr. ESTES. We had $50,000 for it. I had a meeting with a group of citizens in Eastport, and they gave me quite a lot of information about a survey that had been made and the hearings that had been held, either in Maine or New Brunswick, and I felt that with all of that data available, the item of $50,000 which had been carried for it, could easily be cut to $10,000. The information on a lot of this is available and if it is collaborated in one spot, I am positive that the job can be done satisfactorily for what we have quoted.

Mr. MCINTIRE. I see your item here now, "Fishery and miscellaneous investigations." That was your first estimated figure of what would be necessary to make a comprehensive study of the impact of the construction of this project on the fishing industry in that area.

Mr. ESTES. That is right. I understand experts were called in and meetings were held and the entire fishing matter was thoroughly discussed. That information is available, and that is why I cut it down.

I think that is true in every case where we have made reductions in the original estimate. It was because we were satisfied that so

much of the information is now available that it was safe and proper to make the deductions that we did.

Mr. McINTIRE. If I may ask just one further question: You have reviewed rather thoroughly the available information from the fishery and engineering aspects, sufficiently to satisfy yourself that once you are into this survey, we will say, you are not going to find that that source information wasn't what you expected it to be?

Mr. ESTES. No, sir. We feel we are justified in every cut that we have made in those, and as to the performance of our organization, we will give any reasonable security or guaranty that the International Committee might reasonably ask for.

Mr. McINTIRE. Thank you.

Mr. MERROW. Congressman Hale of the First District of Maine is here.

Do you have anything you would like to say?

Mr. HALE. I do not think I have anything to add. I came here to register my interest, as usual.

Mr. MERROW. Senator Smith, have you anything further?

Senator SMITH. No, I have not, Mr. Chairman, except to say again that I am very grateful to you for having the hearings.

The real reason why I got into the matter and introduced the bill back there in 1948, and then after I went over on the Senate side was that these studies and surveys had been going on for a good many years, and we never seemed to come to a place where we were settled in our minds at least as to what could be accomplished, or not.

I have felt that out of all those studies and hearings and surveys and reports that we should go forward and have a complete, final survey and once and for all, for this generation anyway, decide whether the power could economically come from the tides, as has been estimated over in that area.

I am most grateful to Mr. Estes for coming in and taking an interest in this because he has given us some information that will be helpful, whether it is done by the Army engineers, whether it is done by a combination of the Army engineers and the private firms, or whatever comes out of it.

Mr. MERROW. Do you feel in the hearing we had the other day and the one we have had this morning, that we have covered the ground sufficiently? There are no other aspects that you have in mind that ought to be explored?

Senator SMITH. Mr. Chairman, I would not be the final authority on it, except it would seem to me that we were well ready to give consideration to the survey and that there has been enough in this hearing, this one and the other one and in past hearings, to give the committees and the two Houses a chance to report on it, and make recommendation.

I cannot think of anything more.

Do you, Congressman McIntire?

Mr. McINTIRE. No.

Senator SMITH. The only person who might have something to add would be Mr. Weber, of the Joint Commission. Do you think anything could be added, Mr. Weber?

Mr. WEBER. I would be glad to put in a sentence or two in behalf of the Commission.

STATEMENT OF EUGENE W. WEBER, SPECIAL ASSISTANT TO THE ASSISTANT CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, AND MEMBER OF INTERNATIONAL JOINT COMMISSION

I am Mr. E. W. Weber, a member of the International Joint Commission.

I think that the committee should know the status of the Commission in any undertaking of this kind.

If the committee were to authorize or request the International Joint Commission to make this survey, it would imply that we would have to obtain the consent of Canada to join in the survey.

If the committee were to authorize a United States agency, public or private, or a public agency with the assistance of private agencies, to conduct the survey in behalf of the United States, such a United States agency could initiate the survey, with the consent of Canada and without formal participation by the International Joint Commission initially. Any international aspects which arose as a result of that initial effort could be referred to the International Joint Commission whenever appropriate.

Since the International Joint Commission is an international body, there is some question in my mind as to whether the action of our Congress should be to request an international body to do something directly. I think there are some advantages in considering the possibility of a unilateral action initially, with the idea that it would be referred to the international body whenever that became necessary or desirable.

I hope that adds some clarification of the complications that might arise, Mrs. Smith.

Senator SMITH. Thank you very much, Mr. Weber.

My resolution, as you will note, indicates that this should come under the International Joint Commission, and it was purposely done because my feeling is that this must be a final survey and the only way we can go into international waters is by a joint effort.

Mr. WEBER. I might add there, Mr. Chairman, that Mrs. Smith is quite right in that respect. For a final effort on such an undertaking, the International Joint Commission would necessarily be involved.

However, the machinery to get the International Joint Commission into the picture at the proper time would not require the specific action of the Congress. That could follow along, then, at an appropriate time. That is the point that I wish to make.

There would be under certain circumstances no objection to the Commission being brought into it initially or at the outset, except that in this instance, in view of the official hesitancy of Canada to join in a survey, the possibilities for getting together with Canada on the survey might be better if the United States could take some initial steps without formal participation by Canada at the outset.

There is almost complete flexibility across the board in this matter, and I just wanted the committee to know that so that you need not feel that you are hampered by the arrangements that have been made between Canada and the United States for handling of these matters by the International Joint Commission. The problem can be handled in a number of alternative ways that would lead to that very same objective ultimately of having the Commission take official action on the matter at an appropriate time.

Mr. LeCompte. Mr. Chairman, it is the international angle of it that brings it before this committee, is it not?

Senator Smith. Yes.

Mr. LeCompte. Otherwise, it would be before some other committee.

Senator Smith. That is exactly right.

Mr. Chairman, I would like to amend my statement. This is not my personal resolution. I am only 1 of the 5 members of the Maine delegation who have presented this resolution.

Mr. Merrow. If there are no other questions, may I say we have been very happy to have the Maine delegation with us again. We think you have made a fine presentation and have made extremely good statements, and we are happy to have the witnesses with us this morning. It would seem that we have had a thorough exploration of the various aspects of this problem.

(The information furnished by Senator Smith is as follows:)

Minister of Trade and Commerce, Canada,
Ottawa, March 11, 1953.

Hon. Margaret Chase Smith,
United States Senate, Washington, D. C.

My Dear Senator Smith: I have your letter of March 6 regarding proposed overall survey to determine the economic feasibility and cost of the proposed Passamaquoddy tidal power project.

I have noted your resolution which is before Congress.

Regarding the address of D. A. Riley, M. P., in the House of Commons on February 27, 1953, I presume it carries the same weight as would an address by a Member of Congress on the subject of a Government expenditure in the neighborhood of his constituency.

I have taken a considerable interest in this project over a number of years, perhaps partly because I have a summer home at St. Andrews, New Brunswick, overlooking Passamaquoddy Bay, and partly because of my engineering background. After analyzing all the information that I have been able to obtain about the project, it is my personal belief that the cost of the power generated by the project will be far higher than the power presently available from other hydroelectric sources. In other words, I do not consider the project feasible from an engineering viewpoint, for the reason that estimated power costs are excessive. I may say that my view is shared by a great number of my friends in the engineering profession.

Holding these personal views, I have not been favorably disposed toward the project, but I do not know that I have thrown any particular weight against the Canadian approach to the project. As a matter of fact, Canada is not opposed to the project, but, rather believing it economically unsound we are not disposed to advance money for the preliminary examinations. On the other hand, we will facilitate any expenditure your Government may care to make in that regard.

Obviously you believe that power obtained from this project can be sold in the State of Maine. I would not quarrel with your view, I simply say that I do not think it can be sold in the Province of New Brunswick, where very little power is required in the vicinity of the project.

I hope that this explains my own position. The position of the Canadian Government was set out in a note dispatched from Ottawa to your Secretary of State some weeks ago.

Yours sincerely,

C. D. Howe.

Department of State,
Washington, D. C., March 31, 1953.

Hon. Margaret Chase Smith,
United States Senate.

My Dear Senator Smith: Further reference is made to your letter of November 19, 1952, concerning Canadian participation in the proposed Passamaquoddy project investigation. The Department's reply of December 3 stated that Canadian officials had advised informally that lack of Canadian interest in the

power-project surveys was related to the determination of that Government that the power needs of the areas of Canada which would be affected could best be met by smaller installations involving more reasonable amounts of power and lower costs.

On December 5, 1952, the United States Embassy at Ottawa sent to the Canadian Department of External Affairs a formal inquiry as to whether the Canadian Government wished to participate either in a complete power survey or in a separate fisheries survey.

A reply has now been received from the Department of External Affairs expressing the point of view that the various schemes for development of tidal power in the Passamaquoddy area do not appear to be practical at this stage and that further surveys would not seem likely to affect the basic difficulties of high cost to consumers and damage to fisheries. It is pointed out that even if these difficulties did not exist it would not seem advantageous to initiate further surveys until there are available the results of the survey by the Corps of Engineers, United States Army, of depths of water and overburden at the proposed locations of the tidal power works, the report of the New York-New England Interagency Committee at present investigating the hydroelectric power potentialities and the power markets of the area, and the report of the International Joint Commission on the water resources of the St. John River Basin.

The Canadian note concludes:

"If, however, the United States authorities have new information regarding the tidal power schemes and, as a result, feel that it would be desirable to arrange for the further investigation of these proposals, the Canadian Government would welcome receiving such information and would be glad to give further consideration to the question of some form of Canadian participation in an investigation."

Copies of the Embassy's note and of the reply from the Canadian Department of External Affairs are being transmitted to the officials in charge of the studies under reference and copies are also enclosed for your information.

Sincerely yours,

THRUSTON B. MORTON,
Assistant Secretary
(For the Secretary of State).

Enclosures: (1) United States Embassy's Note No. 94, December 5, 1952; (2) Canadian Department of External Affairs Note No. X-66, March 11, 1953.

No. 94

The Ambassador of the United States of America presents his compliments to His Excellency the Secretary of State for External Affairs and has the honor to transmit for the information of the Secretary of State for External Affairs a copy of a report on the Passamaquoddy tidal project, dated May 1952. This report, made by the Corps of Engineers, United States Army, indicates that the estimated cost of a comprehensive investigation of the Passamaquoddy project would be approximately $2,700,000.

On November 9, 1948, the Governments of Canada and the United States of America referred the Passamaquoddy project to the International Joint Commission. The Commission's report of October 20, 1950, unanimously approved the survey and estimated at that time that it would cost $3,900,000, including $300,000 for a fisheries survey. In view of the fact that the enclosed report indicates the possibility of a considerably cheaper project, the United States Government wishes to know whether the Canadian Government would be interested in participating in and contributing to the cost of such a comprehensive investigation.

Furthermore, since the Passamaquoddy project would involve the international water boundaries, the United States Government would be interested in knowing if the Canadian Government would be disposed to grant permission to the United States Government to go ahead with the project, even if the Government of Canada should not be disposed to share in it.

It may be noted that on page 8 of the enclosed report mention is made of the effect of the tidal structures on the fishing industry in the Quoddy area and it is estimated that investigation of the fisheries aspect alone would cost $300,000, which sum is not included in the aforementioned general estimate of $2,700,000. In this connection the United States Government wishes to know if the Canadian Government would be interested in participating in an investigation limited to the fisheries phase of the project.

Enclosure: As stated above.

UNITED STATES EMBASSY,
Ottawa, December 5, 1952.

DEPARTMENT OF EXTERNAL AFFAIRS, CANADA

No. X–66

The Secretary of State for External Affairs presents his compliments to the Charge d'Affaires ad interim of the United States of America and has the honor to refer again to the Embassy's Note No. 94 of December 5, 1952, which raised the question of further surveys in connection with the possibility of developing tidal power in the area of Passamaquoddy Bay and Cobscook Bay, in the vicinity of the boundary between New Brunswick and Maine.

The Canadian authorities concerned have given careful consideration to this matter and have been impressed by the following factors:

(1) The conclusions of earlier investigations of tidal power schemes in the Bay of Funday area were that such schemes would probably be uneconomic as the resulting power likely would be considerably more costly than power from other sources including thermal power, (e. g., the investigation conducted by the Canadian Government in 1945 of the Petitcodiac-Memramcook scheme in Canada and the investigations carried out by the United States Federal Power Commission in 1941 concerning the tidal power and markets and in 1934 on the Dexter P. Cooper two-pool scheme.)

(2) There is no evidence available to Canada that power in the large quantities and at the relatively high costs to be expected in the various Passamoquoddy tidal power schemes would find or attract markets in the near future in the New Brunswick area. Moreover, it would seem unreasonable to expect to find markets for this power in adjacent areas because the cost of supplying such areas would involve adding transmission costs to the relatively high costs of the tidal power.

(3) There is evidence, on the other hand, of large and small undeveloped sources of lower cost hydroelectric power available on the St. John River in New Brunswick and related areas and on the Penobscot and Kennebec Rivers in Maine whose potential could be developed at a rate closely paralleling increases in demand for power.

(4) The rate of growth of demand for power in the New Brunswick and related areas suggests that it would be more beneficial to develop the several available sources of lower-cost power to meet anticipated requirements and to attract new industries rather than to undertake one of the tidal power schemes. Presumably if industry is to be attracted to the area by electric power it will only be so attracted if the cost of the power is low.

(5) Tidal power schemes necessitate very large initial capital expenditures and a large market is required immediately capable of bearing the carrying charges on the whole initial capital outlay.

(6) Since the report in 1933 of the International Commission appointed to investigate the probable effects of the damming of the Passamaquoddy and Cobscook Bays on the fisheries of that region, some additional information has been obtained on this aspect of the question. As a result, it would now appear that the great bulk of young herring hatched in neighboring areas, enter Passamaquoddy Bay and Cobscook Bay, remain there for the first year of their life to take advantage of especially favorable food conditions (only a relatively small portion being taken as sardines), and, at the end of a year, move outside the bays to form the basis of the large herring industry. In light of existing information, it must be expected that a tidal power scheme would have a serious effect on the fishing industry.

In view of the foregoing, the various schemes for development of tidal power in the Passamaquoddy-Cobscook area do not appear to be practical at this stage at least. Further surveys would not seem likely to affect the basic difficulties of high cost to consumers and damage to fisheries. Furthermore, even if these difficulties did not exist, it would not seem to be advantageous to initiate further surveys in conection with the tidal power schemes before those are available for study the results of the recent survey by the Corps of Engineers, United States Army, of depths of water and overburden at the proposed locations of the tidal power works; the report of the New York-New England Interagency Committee at present investigating the hydroelectric power potentialities and the power markets of the whole New England area and the report of the International Joint Commission on the Water Resources of the St. John River Basin.

If, however, the United States authorities have new information regarding the tidal power schemes and, as a result, feel that it would be desirable to arrange for the further investigation of these proposals, the Canadian Government

would welcome receiving such information and would be glad to give further consideration to the question of some form of Canadian participation in an investigation.

L. D. W.

OTTAWA, *March 11, 1953.*

THOMAS WORCESTER, INC.,
Boston, Mass., July 24, 1953.

The HONORABLE MARGARET CHASE SMITH,
United States Senate, Washington, D. C.

DEAR SENATOR SMITH: May I again express my very sincere appreciation for the opportunity you arranged to have me appear in behalf of the Thomas Worcester, Inc., before the subcommittee of the House Foreign Relations Committee.

Our engineers, after the study of the entire Quoddy project, informed me they were prepared to have a complete final report in or within 1 year from the time the information we requested in our letter to you was placed at our disposal.

This report would include preliminary plans for the entire work, all of the items in our breakdown of survey costs, and would include estimated costs of the complete project and the amount of power it would generate. It would settle, once and for all, whether or not the cost of producing power per killowatt would permit a sales price within the range private industry expects or is willing to pay.

At the hearing I was not questioned and I neglected to mention the time element in reference to our survey, and you may use this information in any way you decide is proper.

Very sincerely yours,

THOMAS WORCESTER, INC.,
ROSCOE E. ESTES,
Administrative Engineer.

Mr. MERROW. Mr. McIntire.

Mr. MCINTIRE. Mr. Chairman, I have just a brief statement which I would like to make.

One of the most outstanding favorable aspects associated with the Quoddy project is the fact that the construction of such a project would require no acquisition of land on the part of the Federal Government. As was stated in testimony previously presented to this committee, Quoddy belongs to the ocean, the keynote of the project being water rather than land.

This characteristic of Quoddy takes on glittering importance when it is considered in the light of the fact that the Federal Government, in building Federal projects, is frequently confronted with a substantion outlay of moneys for acquiring land essential to the projects. At this point, an examination of land costs related to two well-known Federal projects will help to bring these cost features into focus.

For instance, it can be pointed out that in the case of Garrison Dam and Reservoir, N. Dak., the Federal Government will have to acquire approximately 480,000 acres of land, a plot of land bigger than the State of Rhode Island, to successfully complete this project, and the total cost of this land acquisition is estimated to be $18,023,300. Of this total cost, $15,015,187 represents cost of land taken and cost of land rights, while $3,008,113 of this amount represents the combined costs of damages resulting from relocation of monuments as provided for in Public Law 437, 81st Congress, family resettlement as provided for in Public Law 534, 82d Congress, and building and structure transfers as provided for in Public Laws 203 and 503, 82d Congress.

It is to be noted that the cost figure of $18,023,300 reflects total costs of land acquisition and landrights, exclusive of resettlement programs which, by their very nature, are self-liquidating programs.

In the case of Grand Coulee Dam, State of Washington, the cost to the Federal Government of land and land rights essential to the proj-

ect is represented by the figure $5,502,000, which represents about seven-tenths of 1 percent of the project's total estimated cost of $740,056,000; $3,697,000 of this amount is for reservoirs and dams, $108,000 for the town of Coulee Dam and Federal administration buildings, $957,000 for primary irrigation works, $731,000 for potholes irrigation areas, $1,000 for other irrigation plant facilities, and $8,000 for transmission power facilities.

These, then, are land costs associated with two Federal projects, land costs which, it is plain to see, are not insubstantial in nature—no such costs would be related to a Quoddy project, thus reflecting a material saving relative to overall cost of project construction.

In summary, then, it can be said that when the sum of $3 million as requested in the resolutions now before your committee is considered as against the potential economy inherent in Quoddy's nature, one can readily feel justified in concluding that such a sum represents little more than an investment in determining whether or not it is in the realm of the practical to capitalize on such economy. In this day and age, when "high costs" is the theme that pervades every economic overture, it would be inconsistent with the dictates of wisdom to ignore such a fine prospect for economy.

Mr. Chairman, I would like to join with the senior Senator from Maine in expressing our sincere appreciation to you and the members of the committee and to the representatives of the Corps of Engineers, to Mr. Estes and to his firm, and to Mr. Weber for their interest in joining with us in a presentation to this committee of the factors concerning this project, a survey of the potential of Passamaquoddy which is of deep interest to the citizens of Maine.

Thank you very kindly.

Mr. MERROW. We have been very happy to have you with us, and we are very glad that we have had such a fine presentation of the entire subject.

If there is nothing more, the committee stands adjourned.

(Whereupon, at 11:50 a. m., the committee adjourned.)

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